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VOL. X

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Original Communications

PYELOGRAPHIC FINDINGS IN PYELITIS COMPLICATING PREGNANCY*

BY JOHN T. WILLIAMS, M.D., F.A.C.S., BOSTON, MASS.

(From the Gynecological Service and the X-ray Department of the Boston City Hospital)

PYEELITIS complicating pregnancy was first described by Rayer, in 1840, and later by Reblaub, in 1893. General recognition of this condition, however, dates back only to Opitz's paper,¹ in 1905. Since the latter's article, an immense literature has accumulated upon this subject. It is not my intention to deal with the bacteriology, the diagnosis, or the treatment of pyelitis but to confine myself to certain points in the etiology which have been brought out by routine pyelographies. For the past year and a half I have done routine cystoscopies and pyelographies on all suspected cases of pyelitis during pregnancy coming under my care at the Boston City Hospital.

I do not mean to convey the impression that cystoscopy or ureteral catheterization is a necessity in every case either for diagnosis or treatment since most cases subside with purely expectant treatment, but I have done these routine pyelographies for the purpose of obtaining information as to the anatomic condition of the kidney pelvis and ureters in these patients.

Hirsch² examined 300 autopsy records on patients dying during pregnancy or the puerperium. Dilatation of the upper urinary tract was reported in 30 per cent. Stöckel³ states that obstruction of the ureter may occur at one of three points: (a) at junction of kidney pelvis and ureter, (b) at brim of pelvis, (c) at entrance of ureter into bladder.

*Read before the Obstetrical Society of Boston, February 24, 1925. Read in abstract at the Boston City Hospital Clinical Meeting, November 14, 1924, and before the Boston City Hospital Alumni Association, April 25, 1925.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

Kretschmer⁴ showed pyelograms taken before and after delivery in a case of pyelitis complicating pregnancy with distended ureter and kidney pelvis showing marked diminution in size of the dilated pelvis after delivery. He also stated that he had repeatedly demonstrated by the same method a rapid shrinkage in size of dilated pelves after delivery. Kretschmer believes that the dilatation during pregnancy of the kidney pelvis and ureter is only temporary and that return to normal takes place rapidly after delivery. All authors agree that pyelitis is more common on the right but Kretschmer demonstrated bacteriuria on both sides in twenty out of twenty-five cases of pyelitis during pregnancy. In five cases the bacteria were found only in the right ureteral urine and in no case in the urine from the left kidney only. He quoted a Swiss observer who found that girl babies under his care who had pyelitis in infancy again developed pyelitis when they grew up, married, and became pregnant.

Three possible routes of infection may enable bacteria to reach the kidney pelvis. These are: first, by the blood stream; second, by the lymphatics; third, by direct ascension along the urinary tract. In this connection it may be well to say that practically all writers agree that in the overwhelming majority of these cases the infecting organism is the colon bacillus. Klowitz⁵ and Ayers⁶ were first to direct attention to the hematogenous route. Widal and Bernard⁷ reported in 1912, two cases of pyelitis during pregnancy in which they were able to isolate colon bacilli from both the blood and urine. Agglutination reactions proved these bacilli to be identical.

Passing now to the lymphatic route; Francke⁸ has made an exhaustive study of the lymphatics of the ascending colon and right kidney. He found by injecting the lymphatics of the large bowel that on the right side these pass over to the capsule of the kidney. He, therefore, concluded that on the right (and by inference) probably also on the left, there exists a direct lymphatic communication between the large bowel and the kidney pelvis. Another possible channel for lymphatic infection has been suggested by Baureisen⁹, namely direct ascension from the bladder along the lymphatics of the ureter.

Passing now to the urinary route: Goldschmidt and Lewin¹⁰, and Markus¹¹ have demonstrated experimentally, and Kretschmer¹² clinically that under certain conditions of overdistention regurgitation may take place from the bladder into the ureters. Of course urinary stasis in an obstructed and distended kidney pelvis would favor bacterial growth by whatever channel the organisms reached it.

In the discussion of Kretschmer's and Falls'¹³ papers at the American Medical Association meeting in 1923, Holmes¹⁴ of Chicago brought out a most important point as the pyelograms about to be exhibited will show: namely that we must distinguish between pyelitis of pregnancy and pyelitis in pregnancy.

A summary of the clinical aspects and the pyelographic study of my cases together with the pyelograms of some of the more striking cases will follow. At this point I wish to acknowledge my indebtedness to Dr. P. F. Butler and his associates in the x-ray department of the Boston City Hospital for the photographic work and interpretation of the films.

CASE 1.—D. C., aged thirty, married, para iv. Three previous labors were normal. In the third pregnancy, however, the patient was kept in bed for three weeks before delivery because of kidney trouble. She was admitted to Boston City Hospital, June 14, 1923, seven months' pregnant. She had had severe headache for past two weeks, but no other symptoms. Blood pressure systolic 274, diastolic 140.

Urine; acid, specific gravity 1.014; no sugar; a large trace of albumin. Sediment showed many hyaline and granular casts; numerous red blood corpuscles, and some pus cells. On July 7, three weeks later, developed severe pain in right costovertebral angle. Some burning was felt on micturition; costovertebral tenderness, pain and spasm in the right flank were present. Urine: amber, 1031, acid, albumin a slight trace; sediment showed numerous pus cells and blood corpuscles.

July 11, the patient miscarried of a macerated fetus. The pain in the right kidney region continued however.

Cystoscopy July 23, showed right ureteral orifice slightly swollen. Both ureters were catheterized. Urine from the right ureter showed many pus cells, some clump-



Fig. 1.—Case 1. Postpartum. Showing pyelonephritis of long standing.

ing, and a rare hyaline cast. Urine from the left ureter showed occasional pus cells and blood corpuscles and a rare hyaline cast. Pyelogram showed the right kidney pelvis dilated and the calyces distorted.

On July 28, patient was transferred to one of the surgical services and on August 21 the right kidney was removed. Patient made a good recovery and was discharged August 24 in fairly good condition.

Summary: A case of pyelonephritis superimposed upon a chronic nephritis, requiring nephrectomy.

CASE 2.—E. L., aged twenty-one, married, para ii. First pregnancy in 1922 was complicated by pyelitis, but terminated normally. Patient entered Boston City Hospital April 15, 1924, five weeks' postpartum; she complained of pain in region of

right kidney beginning two weeks before delivery, which occurred at the seventh month of pregnancy. Temperature normal. Patient showed distinct tenderness in right costovertebral angle over the right kidney and along the course of the right ureter. No spasm. Urine (catheter specimen) showed the slightest possible trace of albumin, many pus cells, occasional epithelial cell and no casts. Cystoscopy showed the bladder normal, except for marked injection of the trigone. Ureteral orifices were not swollen. Ureters catheterized; pyelogram showed a kinked ureter at about level of third lumbar vertebra. No dilatation of kidney pelvis. Pain disappeared after catheterization and patient was discharged relieved three days later.

Summary: Mild pyelitis. Kinked ureter. Improvement after catheterization.



Fig. 2.—Case 2. Postpartum. Showing ureter kinked at level of third lumbar vertebra.

CASE 3.—Mrs. O'N., aged twenty-nine, married, para iii. Previous pregnancies normal, but some complaint of right-sided pain for past three years. The patient entered Boston City Hospital April 20, 1924, three months' pregnant. There was severe pain in region of right kidney for twenty-four hours. Temperature 99.4°, white count 11,200. Tenderness was present in right costovertebral angle and along course of right ureter. Urine: albumin a slightest possible trace. Sediment showed many pus cells in clumps.

Cystoscopy showed bladder and ureteral orifices normal. The urine from the left ureter showed a few blood corpuscles, but no pus cells. The urine from the



Fig. 3.—Case 3. Three months' pregnant. Pyelogram of right side. Kidney pelvis and ureter greatly dilated.

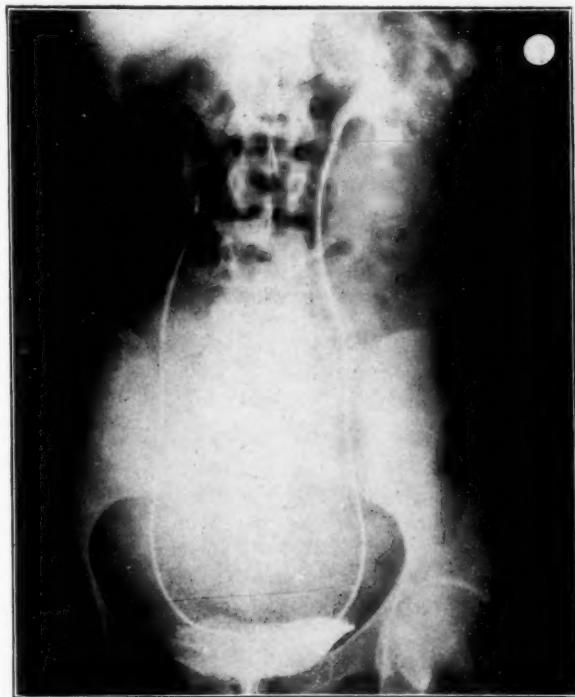


Fig. 4.—Case 3. Pyelogram of left side. Normal.

right ureter showed a few pus cells and some blood corpuscles, and also a rare granular and hyaline cast. Pyelogram showed the right kidney pelvis and ureter greatly dilated. The left kidney and ureter were normal. Symptoms improved following catheterization and patient was discharged relieved.

Summary: Old hydronephrosis with acute pain during the fourth month of pregnancy.



Fig. 5.—Case 4. Five months' pregnant. Slight dilatation of both kidney pelvises.

CASE 4.—E. W., aged thirty-one, married, para ii. First pregnancy was complicated by pain in both sides of abdomen and back. The patient entered Boston City Hospital December 1, 1924, five months' pregnant. Attack of pain in the right side one month's duration. Temperature was normal. No costovertebral tenderness, but distinct tenderness along right ureter. The urine was absolutely negative. Cystoscopy showed a normal bladder. Ureters were catheterized without difficulty. Pyelogram showed slight dilatation of right kidney pelvis. Patient's symptoms disappeared after catheterization and she was discharged a few days later.

Summary: Slight dilatation of kidney pelvis probably due to pressure on ureter, which was relieved by catheterization.

CASE 5.—A. McP., aged thirty-six, married, para x. Patient had had nine full-term normal pregnancies. She entered Boston City Hospital Dec. 9, 1924, four months' pregnant. For four days she had had severe pain in right kidney region,



Fig. 6.—Case 5. Four months' pregnant. Dilatation of both kidney pelvises.

vomiting and fever. There had been no previous attack. Temperature was 101.2° ; white count 12,800. Right kidney was palpable and very tender. Urine: color normal, acid, specific gravity 1.022, albumin a trace; sediment consisted chiefly of pus cells.

Cystoscopy showed the bladder injected in the region of the right ureteral orifice, which was distinctly swollen. Both ureters were catheterized. Pyelogram showed the right kidney pelvis and ureter dilated and the ureter somewhat kinked. The left kidney pelvis was slightly dilated but the calyces were normal. The tem-

perature dropped to normal forty-eight hours after ureteral catheterization, and patient was discharged relieved one week later.

Summary: Dilated kidney pelvis and kinked ureter predisposing to pyelitis and occurring too early in pregnancy to be due to pressure from uterus.

CASE 6.—M. H., aged twenty-five, married, para iii.

Previous pregnancies were normal. The patient entered Boston City Hospital December 1, 1924, eight months' pregnant. Dysuria and right-sided pain of one week's duration. Temperature was normal. Pain and tenderness referred to right costovertebral angle and right kidney region. Urine alkaline; straw-colored, albu-



Fig. 7.—Case 6.—Normal pregnancy, 8 months. Slight dilatation of left ureter and kidney pelvis.

min a slightest possible trace; no sugar; sediment showed a moderate number of pus cells, no blood or casts.

Cystoscopy showed bladder generally injected, right ureteral orifice swollen; left normal. The right ureter could not be catheterized for more than 2 cm. because of pressure of the fetal head, although three different sized catheters were tried. The left ureter was catheterized without difficulty and pyelogram showed slight dilatation of the left ureter and kidney pelvis.

Summary: Mechanical obstruction from pressure of fetal head. Probably a true pyelitis resulting directly from urinary stasis due to pressure.

CASE 7.—E. B., aged twenty-three, married, para ii. Patient had attack of right-sided pain during last month of first pregnancy, which terminated, however, in normal labor two years previously. She entered Boston City Hospital November 21, 1924, five months pregnant. Severe attack of pain in right kidney region of

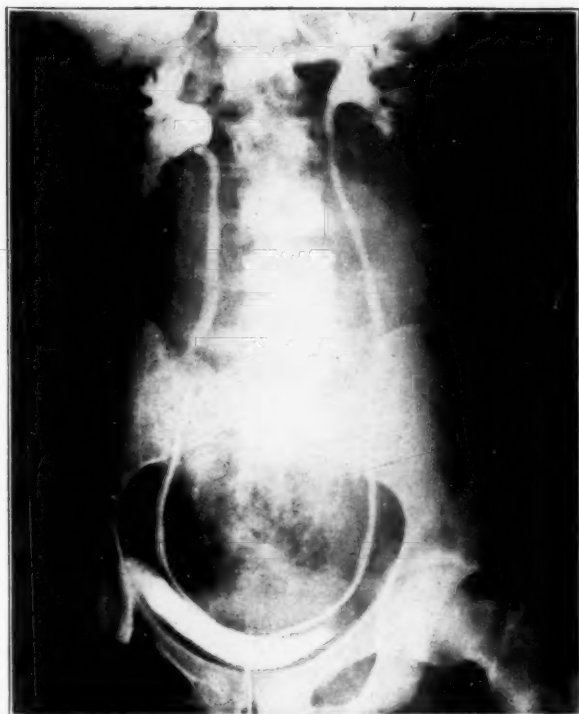


Fig. 8.—Case 7. Five months' pregnant. Dilated kidney pelvis and kinked ureter on right side. Slight dilatation of left kidney pelvis.



Fig. 9.—Case 8. Six months' pregnant. Left ureter and kidney pelvis dilated.

three weeks' duration. Similar attacks five years previously and during previous pregnancy as above noted. Temperature was normal. Examination shows slight tenderness over right kidney and in right costovertebral angle. Urine showed no albumin; sediment absolutely negative.

Cystoscopy showed a normal bladder. Both ureters were catheterized. Pyelogram showed the right kidney pelvis dilated and distorted, the ureter kinked at its junction with the kidney pelvis. The pelvis of the left kidney was very slightly



Fig. 10.—Case 9. Three months' pregnant. Both kidney pelvis dilated. Both ureters kinked.

dilated. Pain disappeared after catheterization, and patient was discharged to Out-Patient Department.

Summary: Slight hydronephrosis antedating present pregnancy increased by pressure of uterus on ureter.

CASE 8.—J. N., aged thirty-two, married, para i. Patient entered Boston City Hospital November 19, 1924. Attack of pain in region of left kidney two days' duration. Temperature was 100°. Distinct costovertebral tenderness on the left. Uterus was size of six months' pregnancy. Urine acid, albumin and sugar absent. Sediment: very few blood corpuscles; no pus. Cystoscopy: bladder and ureteral orifices normal. A pyelogram showed the left ureteral and kidney pelvis dilated.

Calyces were somewhat obscure. Fetal skeleton visible. Pain disappeared after catheterization of ureters and patient was discharged to the Out-Patient Department.

Summary: Dilated ureter and kidney pelvis without inflammation, probably directly due to compression by fetal head.

CASE 9.—L. M., aged twenty-two; married, para ii. Patient entered Boston City Hospital November 5, 1924, three months pregnant. Attack of pain in both flanks of twenty-four hours' duration. Both kidneys palpable, prolapsed, slightly enlarged and slightly tender. Urine: normal, acid, albumin a slight trace, no sugar. Sediment: entirely composed of pus cells.

Cystoscopy; bladder normal. Both ureters were catheterized. Sediment from both showed considerable pus. A pyelogram showed both ureters dilated and kinked, both kidney pelvis dilated. Pain disappeared after ureteral catheterization and patient was discharged four days later.

Summary: Old bilateral hydronephrosis with acute exacerbation due to pregnancy.

CASE 10.—H. M., aged twenty-three; married, para ii.

Previous labor in 1922 normal. Patient Boston City Hospital November 19, 1923, six months pregnant. For one month patient had had pain in the right flank with chills, sweats and fever. Some dysuria. Unable to extend right side completely. Temperature 101°; white count 11,200. There was a tender swelling in the right flank extending from the costal margin to the crest of the ilium, which seemed to be superficial to the kidney. Complete extension of right thigh impossible. Urine; cloudy, alkaline, specific gravity 1.024, albumin a trace, no sugar. Sediment; many pus cells singly and in clumps. Few blood corpuscles. Rare granular cast.

Cystoscopy; bladder normal in appearance. Ureteral orifices were not swollen. On the right side the catheter met with obstruction about one-third of the way to the kidney. The left ureter was catheterized for its entire length. A pyelogram was taken of the left kidney pelvis, which showed it to be dilated and the calyces absent. The diagnosis was thus made of a pyelonephrosis on the left side and a perinephritic abscess on the right. Two days later this abscess was drained and several ounces of thick pus evacuated, a culture from which showed a mixed infection consisting of staphylococci and streptococci. Following drainage of this abscess, temperature fell to normal and remained normal for three weeks. In the meantime two and a half weeks after operation a second cystoscopy was done. Both ureters could now be catheterized without difficulty and the urine from each showed the presence of pus. A pyelogram was now taken of the right side, which showed marked distention of the ureter and kidney pelvis.

December 31, three weeks after operation, patient suddenly had a chill and elevation of temperature. The following day she went into labor and delivered herself of a premature child, which lived only a few minutes. From this time the patient continued to run a slight elevation of temperature and to fail steadily. A blood culture was negative. The white count on January 10, was 17,800. About January 7, patient developed a terminal pneumonia, from which she died on January 17, forty days after operation. There was no autopsy.

Summary: Bilateral pyelonephrosis antedating the pregnancy and complicated by perinephritic abscess during the seventh month of pregnancy.

CASE 11.—R. S., aged twenty-five, single, para i. Patient entered Boston City Hospital July 1, 1925, six months pregnant. Repeated attacks of pain of the right kidney region over a period of six years. Tenderness over the right kidney which was not palpable. Urine slightly smoky, neutral, specific gravity 1.008. Sediment: no casts but considerable pus and some red blood corpuscles.

Cystoscopy showed a normal bladder and ureteral orifices. Pyelograms showed the

right kidney pelvis enlarged and the ureter kinked at the pelvic brim and dilated from this point upward.

Patient was discharged a few days later to the Out-Patient Department, but returned August 30 in labor and was delivered. Thirteen days postpartum a second pyelography showed the right kidney pelvis and ureter still dilated. She was discharged relieved on September 16.

Summary: Dilated and kinked ureter and dilated kidney pelvis antedating pregnancy by several years.

CASE 12.—K. A., aged thirty-eight; married, para vii. Patient entered Boston City Hospital May 1, 1925. Slight pain and tenderness along course of ureter for two weeks previous to admission. Urine: normal, acid, specific gravity 1.009. Albumin and sugar absent. Sediment, few leucocytes and occasional blood corpuscle.

Cystoscopy showed an essentially normal bladder. Pyelogram showed a slightly dilated kidney pelvis on the right side. Patient was discharged to the Out-Patient Department a few days later.

Summary: Slight dilatation of kidney pelvis due probably to compression of ureter by enlarged uterus.

INTERPRETATION OF FINDINGS

Radiographic findings in eight (Cases 1, 2, 3, 5, 7, 9, 10, 11) of the eleven cases suggested kidney damage too great to have been produced within the duration of the pregnancy, especially in Cases 3 and 9 in which the patients were only three months' pregnant, and Case 5, who was only four months' pregnant, when symptoms developed. In these early cases there was not sufficient uterine enlargement to cause compression of the ureter. In five patients a history of previous symptoms referable to the kidney was elicited. In the remaining three, while no such history was obtained, the pyelographic findings and duration of the pregnancy left no doubt of the existence of previous trouble.

Three cases (4, 6, 8) showed only slight dilatation of the kidney pelvis which might well have been due to ureteral compression in the existing pregnancy but one of these (Case 4) also gave a history of pyelitis during a previous pregnancy.

This analysis of my findings gives striking emphasis to the idea of pyelitis during pregnancy being most frequently merely the lighting up of a preexisting process. I am not prepared to deny that there are cases of pyelitis which develop for the first time during pregnancy. A few of my own cases seem to have been of this type, but the majority were undoubtedly instances of a chronic dilated kidney pelvis which with the additional strain of pregnancy and the additional urinary stasis caused by ureteral compression developed an acute exacerbation of pyelitis.

Further analysis of the pyelographic and clinical records of these cases reveals the fact that in eight patients the right side only was involved; in two, both kidneys, and in but one patient the left side only. This is in accordance with the clinical experience of others al-

ready quoted. Various reasons have been given for the preponderance of right-sided lesions. Among these may be mentioned the right lateral torsion of the uterus common in pregnancy, abnormal mobility of the right kidney,* the fact that the fetus more commonly occupies the right oblique diameter of the pelvis, and finally the closer relationship of the ascending colon and its lymphatics to the right kidney.

Since Glénard's day¹⁵ the frequency of movable kidney on the right side in the female has been generally recognized. Movable kidney predisposes to ureteral kinks and dilated pelvis. The pyelographic findings in my series furnish evidence of the presence of these conditions in pyelitis. The proximity of a source of bacterial infection in the colon and its lymphatics must also receive serious consideration in the etiology of pyelitis during pregnancy. Pressure of the fetal head after engagement does cause displacement and undoubtedly compression of the ureter. I met with one case in this series (Case 8) where catheterization of the right ureter was impossible and one or two patients without symptoms of pyelitis in whom I could not catheterize either ureter because of displacement of the orifices by a head in the pelvis. That torsion of the uterus entered into the etiology of any of the cases in this series is to be doubted as more convincing explanations of the pathology present were obtained.

The importance of the facts brought out by this study lie in a proper conception of pyelitis during pregnancy not as a condition due directly to the pregnancy but as, in the majority of cases at least, a chronic preexisting condition brought to a state of acute activity by the pregnancy, and not to be dismissed without further consideration after the pregnancy has terminated. The mechanism of the attacks of pyelitis during pregnancy appears to be as follows: a prolapsed kidney with dilated pelvis, with or without a kinked ureter; additional strain upon the excretory apparatus during pregnancy with later some ureteral compression by the fetal head; urinary stasis; infection with the *Bacillus coli*; recovery from acute symptoms after drainage is secured by ureteral catheterization or the end of the pregnancy; but persistence of the original conditions which predisposed to the acute attack leaving the way open to further trouble.

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*Since the reading of this paper an important work has been published by Mathé (*Surgery, Gynecology and Obstetrics*, 1925, xl, 605) giving the results of his investigations, pyelographic and clinical, of the frequency of movable kidney and the mechanical factors producing it.

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483 BEACON STREET.

HERMAPHRODITISMUS EXTERNUS FEMININUS*

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ON several previous occasions I have discussed the subject of hermaphroditism as a whole or in part.^{1, 2, 3} Moreover, in addition to the cases already described, I have seen others which I have been unable to record lest the matrimonial irregularities which existed should come to the knowledge of those concerned.

There is, however, no such objection in regard to the four examples of intersexuality now reported for the first time. They were similar in type; that is to say, in each the internal genitalia were feminine in character, whereas the external genitalia showed evidence of masculine differentiation in that there was in each a phallus hypertrophied to the extent seen in the male. On the under surface of the phallus the well-developed inner genital folds ran on either side of a urethral groove, which terminated at the urethral orifice situated in the position normal to the human female, and united behind rather further forward than normal, to form the fourchette (Fig. 1). There was, therefore, in these cases a close resemblance to the appearance seen in hypospadias in the male—a matter of considerable clinical interest to the practitioner called upon to make a diagnosis, as I shall demonstrate directly.

The secondary characteristics were not only masculine in type, but also precocious in onset.

I shall first recount the particulars of the four cases, and afterwards discuss, as far as I am able, their developmental significance.

CASE 1.—G. S., age four years, nine months. The parents state that hair appeared on the vulva when the child was ten months old, and that when she had reached the age of three years, they thought from the appearance of the external genitals that she might be a boy, especially as her habits and behavior were boyish in character.

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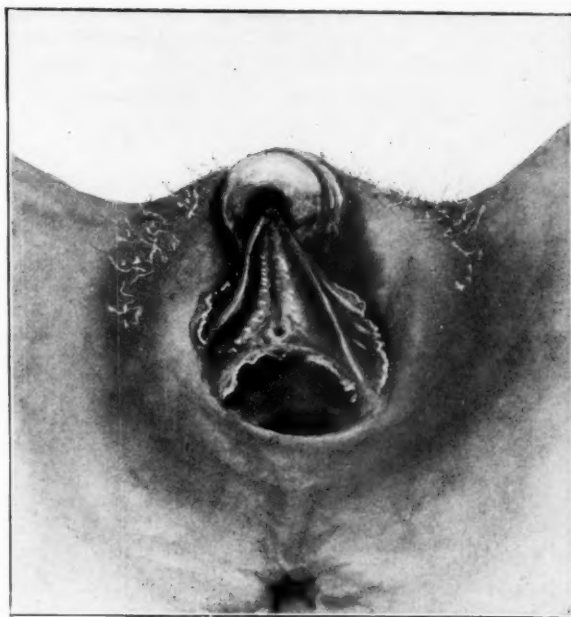


Fig. 1.—Slightly diagrammatic drawing to illustrate the disposition of the various parts of the external genitals in the four cases of hermaphroditismus externus femininus described in this paper.

Five months before I saw her, she had measles. Her doctor then examined her for the first time and subsequently sent her to me.

She was an overdeveloped, very muscular child (Fig. 2). In height she measured 4 feet and 1 inch, and she weighed 65 pounds. Her mentality was normal, perhaps above the average in regard to general knowledge. Her voice was harsh, and she



Fig. 2-A.



Fig. 2-B.



Fig. 2-C.

Fig. 2-A, B, and C.—Photographs of the patient described under Case 1. The three attitudes show somewhat masculine muscular development and appearance.

was described by her parents as being "rough like a boy." This statement was confirmed by the nurses who attended to her. The mammae were not developed. The mons veneris and labia majora were covered with long, curly, dark hair, and the phallus was greatly hypertrophied (Fig. 3). The distribution of the various parts was similar to that depicted in the diagram (Fig. 1).

To settle the question of sex from the legal point of view, and in order that the suprarenals might be examined, laparotomy was performed. Nothing abnormal in connection with the suprarenals was discovered. A rudimentary uterus was found together with tubes and infantile ovaries. A small piece of the left gonad, removed for histologic examination, was subsequently observed to be ovarian in nature (Fig. 4).



Fig. 3.—Photograph of external genitalia of patient described under Case 1. There is great hypertrophy of the phallus with a precocious and dense growth of hair on the labia majora.

The hypertrophied phallus was excised, and the entrance to the vagina laid bare.

CASE 2.—M. C., age seven years. The parents first noticed that the child was abnormal when she was four years of age.

I was asked to see her in order to decide the sex. She was found to be of average height and weight for her age. The parents stated that she had always been bright at school, to which she first went at the age of six years. She was intersexual in appearance, and it was stated that she was very rough at play and shouted like a boy. The mammae showed slight development. The external genitalia (Fig. 5) resembled those seen in Case 1, and there was a considerable amount of hair on the vulva, but not so much as in the first case.

Bimanual examination, with the patient under anesthesia, revealed a rudimentary uterus in the middle of the crescentic band which could be felt running across the pelvis behind the bladder.

The clitoris was excised and the entrance to the vagina exposed.

Subsequently the abdomen was opened and a portion of the right gonad, apparently a very small ovary, was removed for histologic examination (Fig. 6). Long muscular strands extending from the fallopian tubes were seen to join in the midline to form a crescentic pelvic septum in the middle of which was a very rudimentary uterus.

CASE 3.—J. F., age thirty-one. The patient had long known that she was not normal. She stated that a sister was subjected to operation for a condition similar to her own.

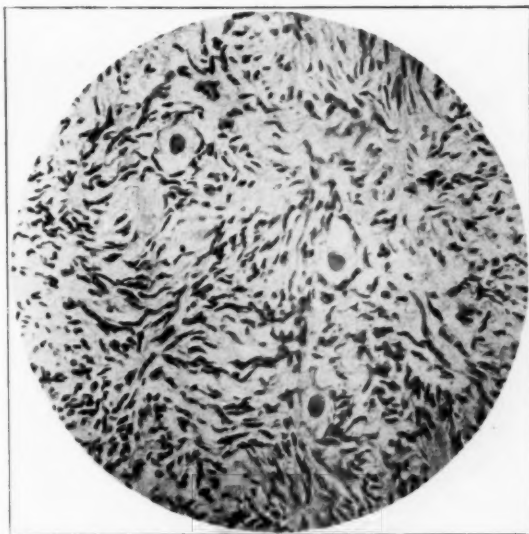


Fig. 4.—Photomicrograph of section of one of the gonads in Case 1. Primitive ova are clearly shown. X 230.

She herself was very masculine in appearance and for five years had shaved regularly. For many years she had noticed that her voice was deep. She had never menstruated; but said that she had sexual feelings towards men.

On examination the mammae were found to be undeveloped and a plentiful growth of hair on her face and chest was observed.

The external genitalia (Fig. 7) were in all particulars similar to those in the two preceding cases.

Laparotomy was performed. Nothing abnormal in connection with the suprarenals was discovered. The underdeveloped uterus, tubes, and ovaries (Fig. 8) were removed. Afterwards, the hypertrophied clitoris was excised and the operculum occluding the entrance to the vagina was divided.

Subsequently the patient assumed a more feminine appearance and demeanor, and had definite menopausal symptoms. This extraordinary happening I have observed on other occasions after the removal of inactive ovaries.

The patient has now married, and I have been obliged to enlarge further the vagina.

CASE 4.—M. W. S., age twenty-eight days. This infant was brought to the Maternity Hospital by her mother, a Jewess, who was much concerned at the intersexual appearance of the child, probably for reasons connected with her religion.

The child was well developed and appeared to be quite healthy.

There was a patent vaginal canal in the normal situation. No attempt has yet been made to discover whether the uterus is present. The appearance of the vulval part (Fig. 9) exactly resembled that seen in the other cases already described.

The mother has been advised that the child is, in all probability, a girl and should



Fig. 5.—Photograph of the external genitalia of patient described under Case 2.

be treated as such, even though she becomes, as indeed she may, boyish in character; and also that the secondary characteristics may be precocious, and that the offending phallus should be removed when the child is a little older.

DISCUSSION

An interesting fact in regard to these cases is the coincidence that one observer should have seen within a few months four exactly similar cases of a type of intersexuality that is of considerable rarity.

It is well known that in a large proportion of all cases of partial hermaphroditism the gonads are masculine in type—that is, they are testes.

Neugebauer⁷ has collected in his great compilation a vast array of cases showing evidence of intersexuality. From these, it is possible to

separate 921 in which the nature of the gonads had been more or less definitely established; 734 of the persons concerned had testes, and 187 had ovaries. It follows, therefore, that in all cases of so-called "partial hermaphroditism" 80 per cent have masculine gonads.

Quinby⁸ and others in recent years have reported isolated cases of *hermaphroditismus externus femininus*. Quinby's case is very fully described, and is of special interest in that he did not discover a vagina, although this was probably present; and, he writes, "There is nothing to suggest labia minora." From one of the photographs published by him these appear to have united in the middle line. The description is, however, not clear on this point. Otherwise, Quinby's case resembles those described in this paper.

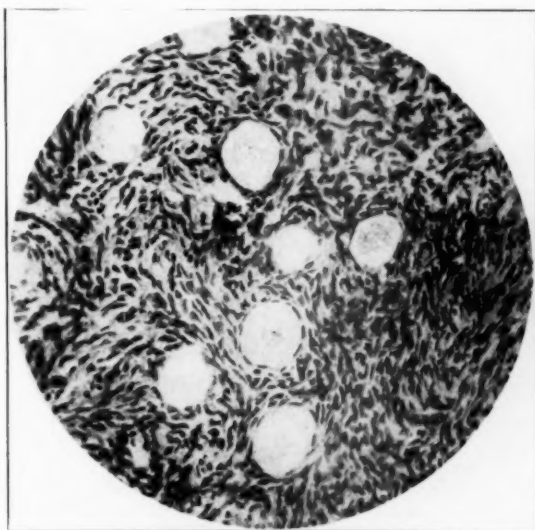


Fig. 6.—Photomicrograph of section of one of the gonads in Case 2. Ova are plentiful. X 230.

The essential points in regard to this type of intersexuality may be summarized as follows:

- (1) Female internal genitalia are present, but the ovaries, fallopian tubes, uterus, and vagina are poorly developed.
- (2) The external genitalia are feminine in type except for the greatly hypertrophied phallus and the partial obscuration of the vaginal orifice by the fourchette, which is further forward than normal.
- (3) The secondary characteristics, psychical and physical, are chiefly masculine, although in adult life the sexual inclination may be towards the male.

(4) Usually there is precocity in regard to the development of the secondary characteristics.

These features may be discussed separately.

First, the genital organs appear to have been laid down normally, but, owing to the subsequent influence of the factors producing the appearance of male secondary characteristics, they never reach functional maturity.

Second, the resemblance in most respects of the external genitalia to those of the normal female is to be expected, for the union of the internal genital folds to form the penile urethra in the male is characteristic of late primary development. The hypertrophy of the phallus no doubt occurs when the masculinity-producing influences appear. Nothing abnormal seems to have been observed at birth by the par-



Fig. 7.—Photograph of the external genitalia of patient described under Case 3. She had been shaved and prepared for operation.

ents in three of my cases, although this is not to say that the hypertrophied phallus may not have been present.

The internal genital folds follow the normal course seen in the female and remain ununited to form the nymphae. In Quinby's case, I presume they had united behind and so completely obscured the vaginal orifice.

The third feature is the atypical sex-ensemble in regard to the secondary sex characteristics. This is a matter to which I have given much thought, and there are two points on which I would lay stress: namely, that *in all cases of partial hermaphroditism the secondary sexual characteristics are opposite in type to the declared sex of the gonads*, and that *the differentiation of the secondary characteristics is later than the primary determination of the gonads*.

Hence, it appears that the determining causes of sex originally predominate in the direction of the defined nature of the gonads, but that masculinity-producing factors arise at a later period—possibly in the last weeks of pregnancy or soon after birth—and counteract the original femininity-producing influences.

Moreover, in regard to the fourth point, since we know that every person is bisexual, however masculine or feminine in characteristics, it is probable that, in cases such as these the forces producing masculinity are so overwhelming that not only is femininity suppressed and masculinity produced, but even precocious masculinity.

The investigations of Bullock and Sequeira,⁴ Glynn,⁵ Neugebauer⁷

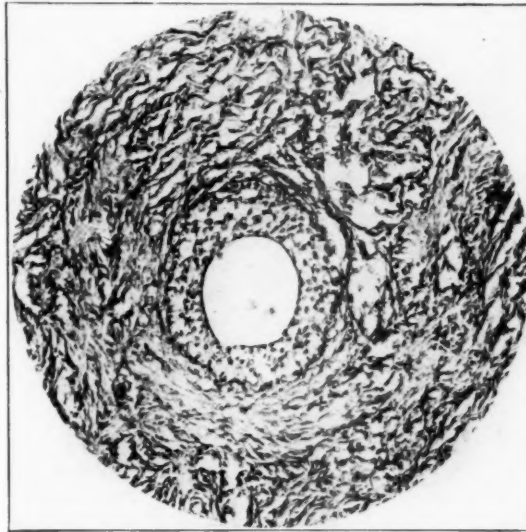


Fig. 8.—Photomicrograph of section of one of the gonads in Case 3. A large graafian follicle is to be seen lying in a loose stroma. X 230.

and others point strongly to the conclusion that pathologic masculinity in early life is often associated with suprarenal hyperplasia and neoplasia.

In my cases, however, there was no evidence to be obtained at operation of any gross lesion of the suprarenals. Further, there was no symptom of pituitary disease.

In the first patient in whom there was a remarkable degree of skeletal overgrowth associated with hypertrichosis, and in whom hyperplasia of the anterior lobe of the pituitary might have been expected, the sella turcica was shown to be normal on radiographic examination.

DIAGNOSIS

When the external genitalia are feminine in type except for hypertrophy of the phallus, and gonads are neither to be found in the in-

guinal region nor in the external genital folds, and when the secondary characteristics are precocious and masculine in nature, a diagnosis of *hermaphroditismus externus femininus* may be made, almost with certainty.

If, however, gonads are felt in connection with hernial sacs in the inguinal regions, a histologic examination of the gonad is sometimes desirable before a diagnosis is made; but this is not necessary if it can definitely be established that the organ is *outside* the hernial sac, for in this case it must be a testis. I do not think enough attention has been drawn to this important point; namely, that gonads in the parts mentioned unassociated with herniae are always testicular in nature. Ovaries in the inguinal region, whether ectopic or herniated, are always contained *within* hernial sacs.



Fig. 9.—Photograph of the external genitals of the infant described under Case 4.

In the presence of testes, the malformation of the external genitalia is of the nature of hypospadias in the male, and this may be seen in different degrees of completeness. For example, a case of hypospadias has been recorded by Henrotay⁶ in which the appearance of the external genitals (Fig. 10) exactly resembled those of my cases. In Henrotay's patient, whose Christian name was Philomena, partly descended testes were discovered in the inguinal regions.

Another case, which recently came under the care of Dr. Dougal, of Manchester, and which he has very kindly communicated to me for publication with my cases, is worthy of record. (Fig. 11.)

A child, twelve years of age, whose height was 5 feet and 4 inches, and who weighed 88 pounds, had been brought up as a girl. The parents were unaware of any abnormality until shortly before seeking advice.

In appearance the child looked like a girl, but the breasts were of a male type, and the eyebrows were strongly marked.

On examination, it was observed that within the upper extremity of the labia

majora on either side there was a hard, rounded, mobile structure, which was tender on pressure. Fine cords could be felt attached to the upper extremities of these bodies.

There was a large penis with well-marked prepuce (Fig. 11). Beneath this there was a smooth area at the posterior extremity of which was the urethral orifice. Further back a small vaginal introitus surrounded by a structure resembling the hymen was to be seen. The vaginal canal measured three-quarters of an inch in length. There was no uterus. The bladder and rectum lay close together above the blind end of the vaginal pouch.

No operation was performed. The condition was considered to be one of complete hypospadias.



Fig. 10.—Photograph of illustration of the external genitals in a case of hypospadias published by Henrotay. The close resemblance of the disposition of the parts in this case to that seen in my patients is very striking.

The diagnosis made by Dr. Dougal in this interesting case is entirely supported by the presence of testes in the upper ends of the external genital folds, by the partial fusion of the inner genital folds, and by the absence of the uterus.

This is not the place to discuss the tremendous difficulties which may surround the diagnosis of sex in certain examples of *hermaphroditismus externus masculinus*: a decision may be impossible unless a portion of the gonad be secured for histologic examination. A full discussion of this interesting anomaly may be found in my book *The Sex Complex*.

It is hardly necessary to say that cases of complete or almost complete hypospadias in the male, such as those described above, are cor-

rectly included under the term "partial hermaphroditism" of the masculine variety. They are so considered by Neugebauer and other writers. Slight degrees of hypospadias with most of the penile urethra and the scrotum properly formed, may be excluded from this description.

TREATMENT

The treatment of cases of *hermaphroditismus externus femininus* consists of amputation of the phallus and division backwards of the fourchette to expose the orifice of the vagina.



Fig. 11.—Photograph of the external genitals in a case of hypospadias seen by Dougal. Again the close resemblance of this condition to that seen in *hermaphroditismus externus femininus* is clearly shown.

I have prescribed thyroid and ovarian extracts in Case 2, mentioned above. In her, the evidence of masculinity in the secondary characteristics is much less pronounced than in the other cases. Such treatment could only be useful when the patient is not completely overwhelmed with masculinity, and while she is quite young.

CONCLUSIONS

1. *Hermaphroditismus externus femininus* is rare, and is probably the result of a sudden access of masculinity-producing secretions after

the genitalia have almost completely developed in fetal or neonatal life.

2. The persons must always be regarded as women, even though they present a masculine aspect.

3. The phallus should be excised, and the entrance to the vagina exposed. The vagina itself may require enlargement should the patient contemplate marriage.

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38 RODNEY STREET.

CANCER OF THE UTERUS AND ITS TREATMENT BY IRRADIATION*

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CANCER of the uterus in its various histologic and anatomic forms continues to be an all too common and fatal disease.

Cancer of the cervix uteri occurs throughout adult life, but more especially during the third, fourth, and fifth decades, and nearly always in women who have borne one or more children. We are, therefore, more and more impressed with the possible etiologic significance of lacerated and infected tissues as precancerous factors, and the importance of promptly clearing up these apparently benign lesions by appropriate treatment.¹

As an evidence of the seeming value of this suggestion, in the 149 cases of cancer of the cervix admitted to the Memorial Hospital in 1924 for treatment, there were but five unmarried women. Ninety-two per cent of the 144 married women, or all but 12, had gone through one or more full-term pregnancies.

In the absence of accurate knowledge of the specific cause of cancer it seems to us that these possible predisposing lesions are of the utmost significance and that much more attention should be given to the hygiene of the vagina and the cervix than has been customary.

If there is a lesion such as an erosion, or chronic endocervicitis, or cystic cervicitis, I believe one of the best ways to treat the lesion is by the actual cautery, especially in the younger women, as this should not give any trouble in the event of subsequent pregnancy. On the other hand in older women, for instance over forty years of age, it

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may be better to amputate the cervix and thus get rid of the cancer-bearing area. As a matter of fact, simple, uncomplicated, superficial erosion of the cervix is infrequent in women over forty years of age and when such a lesion seems to be present it should be regarded with suspicion.

The cervixes of the older women, however, show a great preponderance of lesions resulting from long continued chronic, productive inflammation.

Morbid Anatomy.—The gross lesion in cancer of the cervix usually appears in one of several forms:

1. Asymmetrical enlargement of one side of cervix.
2. Dense infiltrating lesion with tendency to ulceration and crater formation but without hypertrophy of the portio vaginalis.
3. Huge solid hypertrophy of the entire cervix.
4. Fungating, friable cauliflower cervix, varying considerably in size, and frequently showing very little evidence of parametrial involvement.

One hundred and sixty-four cases of carcinoma of the cervix applied for treatment at the Memorial Hospital in 1924 and of this number 149 patients were admitted to the gynecologic division. Of these, 129 were primary cases, and 17 were recurrent after some previous operative procedure, usually hysterectomy. The remaining three cases were admitted for postoperative irradiation. Histologically all but five of the cases were epidermoid squamous cancers. The microscopic picture showed variations in structural detail, small cell types, large cell types, plexiform arrangement of cells, etc. In general, however, the bulk of the tumor growth consists of cells of transitional or polyhedral type with very little tendency to formation of so-called pearls. Five cases were papillary adenocarcinoma of cervical mucous gland type.

Cervical cancer is unusual in that it seldom spreads beyond the pelvis; distant metastases are, therefore, infrequent. The disease almost always remains localized at or near its original site and if recurrence appears after surgical removal or treatment by irradiation, whether the recurrence is prompt or does not appear for years matters not, it is practically always in the pelvic field. Late recurrences seem prone to appear either well out toward the infundibulopelvic portion of the broad ligaments or beneath the vaginal mucous membrane just within the hymen.

The pelvis may at times be blocked by a huge solid invading cancer and rectovaginal and vesicovaginal fistulae be present; the patient may be emaciated beyond description and finally die from uremia after months of suffering and yet a postmortem examination will fail to reveal any cancer beyond the confines of the pelvis. It would seem that this extraordinary tendency of cervical cancer to remain localized

in the pelvis should make it peculiarly favorable for treatment by irradiation.

We have now under treatment a patient in whom the recurrence appeared in the tissues beneath the right lateral vaginal wall just inside the orifice five years after hysterectomy for early carcinoma of the cervix. We had another patient in whom an epidermoid squamous carcinoma appeared in the rectovaginal septum and ulcerated through into the rectum eight years after she had been treated by Dr. Harold Bailey for primary advanced carcinoma of the cervix. Still another case was treated seven years ago by Dr. Bailey for recurrent cervical cancer and now shows another recurrence about half the size of a golf ball between the rectum and the lateral pelvic wall. And so on, in case after case of cervical uterine cancer when the recurrence appears, it will usually be found in the pelvis. Death is usually from hemorrhage, exhaustion, or chronic uremia. From time to time intestinal obstruction occurs and requires colostomy.

Carcinoma of the fundus is always glandular in type, so-called adenocarcinoma or adenoma destruens. Very often the disease seems to remain localized on the endometrial surface for a long time, forming soft velvety elevations and thickenings of the mucosa, causing an increased leucorrhea and occasional spotting of blood but not infiltrating the myometrium. On the other hand, untreated cases not operated until a year or more after the onset of symptoms usually show well-marked invasion of the uterine walls, as well as a tremendous mushy overgrowth of the endometrium. Corpus cancer in contrast to cervical cancer tends to throw out distant as well as local metastases, and not infrequently forms local surface implants on the vaginal mucous membrane. In fact the appearance of these multiple superficial implants in the vagina should make one suspect the presence of primary cancer of the corpus even in the absence of clinical symptoms from the uterus. Many of these cases also have an associated pyometra. In contrast also to cervical cancer, this type occurs chiefly in the fifth and sixth decades of life, after the menopause and is noticeably frequent in nulliparous women.

I have yet to see a well-developed case of adenocarcinoma of the corporeal endometrium presenting invasive tendencies in a patient who has not passed the menopause. On the other hand Norris and Vogt² report fifteen cases or 13 per cent of their entire series under forty years of age.

The only symptom which patients suffering from uterine cervical cancer recognize, that may influence them to seek medical advice, is abnormal uterine bleeding. When one stops to consider that this cannot readily occur until the disease has infiltrated the tissues and weakened or even invaded the blood vessel wall and the lymphatics, it must be evident that this very first symptom really indicates advanced

disease. This conclusion corresponds with our clinical findings on physical examination and is verified by the fact that patients seen within one month after the first symptom of irregular bleeding has been observed, very often show well-marked infiltration of the parametrium and are in an advanced stage of disease. Practically the only exception to this rule is in the fungating cauliflower type, which may cause bleeding from the tumor for months before it invades the parametrium.

There were eight cases of primary cervical cancer in our 1924 series in whom the bleeding was said to have been present not longer than one month, nevertheless, four of these were classed as advanced because the disease had spread beyond the cervix into the parametrium. It is, therefore, evident that we cannot hope for much improvement in our therapeutics based upon the idea of short duration of symptoms as an indication of little disease, for this is an erroneous conclusion.

In support of this I may cite the following case histories:

E. P., aged thirty, single, absolutely no menstrual irregularity or intermenstrual bleeding. Only symptom mucopurulent vaginal discharge for three weeks before admission to hospital.

Examination revealed a hard, nonulcerated cervix, 3 cm. transverse diameter, 6 cm. anteroposterior diameter, fixed by parametrial infiltration especially in the uterovesical area but also beneath the anterior vaginal wall and moderately in both lateral parametria. The growth had progressed beyond the stage of complete surgical removal and the case was classified as advanced.

In other words an infiltrating carcinoma, plexiform epithelioma histologically, was in an advanced stage clinically, and not the slightest irregular bleeding had occurred.

E. B., aged forty-eight, married, multipara. Almost constant bleeding for six or eight months, several severe hemorrhages; recently very foul odor of the profuse vaginal discharge. Patient emaciated and greatly prostrated and brought to hospital by ambulance. Pelvic examination revealed a necrotic, stinking, friable tumor filling the entire vaginal canal. Cervix could not be palpated, corpus normal in size and position. Broad ligaments, on rectal examination, were brawny, swollen and fixed.

Diagnosis: Cauliflower carcinoma of cervix, no definite invasive tendencies but had fungated into the vagina.

The subsequent course of each case has been equally interesting. The first patient has required retreatments with radium and roentgen ray to control parametrial recurrences, whereas the second case has remained entirely free from any evidence of cancer since her primary treatment eighteen months ago.

From the standpoint of age the youngest in our series was twenty-three and the oldest seventy-two. There were six patients under thirty.

In considering the rationale of radiation therapy in cancer it is generally recognized that several important factors are concerned in producing a curative effect. Chief among these are, (1) the radio sus-

ceptibility of cancer cells, (2) the changes in the connective tissues in the irradiated field around the lesion.³

We know that irradiation of the lesion, that is of the cancer cells themselves, with radium is important and brings about very marked regressive or degenerative effects in the primary lesion, and changes in the immediate adjoining tissues, as evidenced by necrosis and marked lymphocytic exudate, sclerosis and thrombosis of blood vessels.

In cancer of the cervix and also of the corpus we feel that irradiation of the entire outlying pelvic field by roentgen rays is important. We base that conclusion on the reaction of connective tissues to x-rays, collagen fibrils are split up, fibroblasts and plasma cells increase markedly in number, there is a protective reaction without the tendency to fibrosis and necrosis which accompanies radium radiation.⁴ Moreover Murphy,⁵ in his experimental work at the Rockefeller Institute on spontaneous mouse cancer, has demonstrated that transplants into regions of the body that have previously been irradiated by roentgen rays fail to grow in a large percentage of instances, whereas transplants into areas not previously irradiated grow in a majority of instances. This we regard as a very suggestive and interesting piece of experimental work.

We are of the opinion that in the treatment of epidermoid squamous cell cancer the best results are obtained by the continuous, rather intensive treatment of the lesion and surrounding areas over a period of one to three weeks. The divided treatment by small doses over a period of weeks or months is much less effective because of the decreasing radio susceptibility of the cancer cells treated in this way. In general this is also the opinion of Prof. Claude Regaud⁶ of Paris.

We have very definite clinical evidence of the beneficial effect of x-ray treatment on parametrial lesions. In several instances in which these lesions persisted after the usual primary treatment had been carried out or where they appeared soon afterward, their complete disappearance has followed further special treatment by the low voltage machine.

M. B., aged thirty-five. Panhysterectomy for carcinoma of cervix, was done June, 1922. Patient admitted to Memorial Hospital, February, 1924, with ulcerating recurrence in vaginal vault, plexiform epithelioma histologically, and a lesion one and one-half cm. in size in right parametrium. After the primary treatment with radium and roentgen ray there was entire regression of the lesion in the vaginal vault and almost complete disappearance of thickening in the right parametrium. About six months later a mass about two-thirds the size of a golf ball could be readily felt in the right parametrium. This was treated with one low voltage x-ray cycle and can now only be recognized on rectal examination as a small nodule less than one cm. in diameter.

J. R., aged sixty-six, married. Admitted March, 1924, with advanced primary carcinoma of cervix, squamous carcinoma histologically. Given full primary treatment with radium and x-ray between March 14 and 20. Three and one-half months

later there was a well marked persistent involvement of the left parametrium which seemed to be increasing in size.

Two twenty-five minute intermediate low voltage treatments were therefore given to the left pelvis anteriorly and posteriorly, and when the patient was again examined four months later the infiltration was much smaller. Another low voltage cycle to the entire pelvis was then given, using two tubes at a time and three months later no parametrial involvement could be detected.

In general where we have parametrial involvement some distance away from the primary lesion and nevertheless feel that thorough treatment can be safely given, we have "stepped up" our low voltage treatment by increasing the time of exposure, the target skin distance, and the filtration. In this way we get a more penetrating ray with more selective action. These treatments can be safely given every three or four days.

What we might call our routine treatment of cervix carcinoma has been based upon the principle of cross firing the lesion and the pelvis from three directions as advocated and instituted by Bailey⁷ at the Memorial Hospital in 1918: (a) by the introduction of filtered capsules into the cervical and lower uterine canal, (b) by the application of a large dose of filtered rays to the cervix and the parametria from the vaginal canal, and (c) by external irradiation. In addition this year we have used bare tubes in the outer border of the primary lesion and especially in those lesions situated asymmetrically with regard to the cervical canal.

In 50 per cent of the early, borderline and advanced cases it has been found desirable to do this, but in the very advanced cases no bare tubes are used or would we advise their use. In the very large bulky lesions we have also inserted platinum filtered needles. In general the minimum dose of radium in millicurie hours is 6000 for a primary lesion, and with the addition of bare tubes or filtered needles it may run up to 9600 hours, besides the x-ray treatments.

In a large proportion of the cases there are marked gastrointestinal disturbances following the treatment. The immediate upset is seldom sufficiently marked to delay the completion of the treatment within the time planned, seven to ten days. From the third to the sixth week after the treatment, however, in those who react badly, severe pelvic pain, loss of appetite, nausea, frequent mucous stools with intense rectal tenesmus may occur. The general prostration in these very ill cases is just as severe as that formerly observed in those subjected to a radical Wertheim hysterectomy without irradiation.

Results of treatment.—We have eliminated from our statistics those cases treated by Bailey and his associates at the Memorial Hospital during 1915, 1916, 1917 for during those years only small amounts of radium were available and various plans of treatment were in vogue and it was not until 1918 that the plan of cross firing the primary lesion and the pelvis was fully instituted. This principle has been closely ad-

hered to ever since, the only changes being in minor details of technic and the substitution, since January, 1922, of the roentgen ray for external treatment instead of the radium block as originally applied by Bailey.

All of the cases treated previous to 1922 were under the supervision of Dr. Harold Bailey and his associates. We can, therefore, report to you the results of treatment by this method with radium alone for three to seven years, to January, 1925 (Table I), and with radium combined with roentgen ray therapy for the last three years (Table II).

TABLE I
CASES TREATED BY RADIUM THERAPY
1918 to 1921 Inclusive. Service of Dr. Harold Bailey

CERVIX	TOTAL	ALIVE JAN. 1, 1925	PER CENT ALIVE
Early	35	14	40
Borderline	52	14	27
Advanced	288	25	8.6
Total Cervix	375	53	14
Recurrent Cervix	139	28	20
Postoperative Irradiation	25	16	64
Corpus	27	12	44

We feel that Table I is worthy of careful study; the percentage of patients in the different groups alive and free from evidence of active disease is highly creditable, and of especial interest is the fact that it represents the end-results of one form of therapy consistently carried out on all cases admitted for treatment whether favorable for a cure or unfavorable. There are no deductions whatsoever from the total, for all cases that have not been seen personally or heard from within six months of January 1, 1925, are recorded as dead. Therefore, it would seem very significant to be able to show 14 per cent of all cervix cases treated, good and bad risks, in good condition three to six years afterward.

The percentages in the recurrent cervix and postoperative irradiation groups, but especially the former would seem to be a very strong endorsement of the value of cross fire therapy.

The postoperative irradiation group was formerly called "prophylactic" by Bailey because these patients had no recognizable lesion when they presented themselves for irradiation after hysterectomy.

The corpus group is somewhat mixed. All have had irradiation therapy and three subsequently had abdominal hysterectomy. From our observation of these cases we have learned that irradiation with radium in adenocarcinoma will tend to hold the cancer in abeyance in a certain number of cases for a period of years but does not necessarily destroy it entirely. Some of these cases have had symptoms of local recurrence in the uterus five or six years after their primary

treatment by radium and apparent cure. Hysterectomy done at this time has revealed adenocarcinoma in the endometrium but no evidence of metastases, a rather interesting observation.

TABLE II
CASES TREATED BY COMBINED RADIUM AND ROENTGEN THERAPY
1922 to 1924 Inclusive. Service of Dr. William P. Healy

CERVIX	TOTAL	ALIVE JAN. 1, 1925	PER CENT ALIVE
Early	44	41	93
Borderline	57	42	73.6
Advanced	252	113	44.8
Total Cervix	353	196	61
Recurrent Cervix	71	41	57.7
Postoperative Irradiation	5	5	100
Corpus	40	28	70

Table II represents the results in cases treated too recently to be of value for comparative purposes. However the underlying thought in the treatment of all these cases has been greater intensity of radiation in the pelvic areas more distant from the primary focus, based on the theory that the reaction of connective tissues to roentgen rays is a protective one and is inimical to the growth of cancer cells.

The three deaths in the early group, Table II, are worthy of comment.

A. D., Full treatment by irradiation in 1922; complete regression of lesion; died nine months later from nephritis without evidence of recurrence of cancer.

E. W. Cervix tandem followed in two weeks by abdominal hysterectomy, two months later vaginal bomb and x-ray. Free from disease for eight months, then a recurrence appeared in left pelvis and grew with great rapidity; the patient died two months later.

A. M. Treated in June, 1924. Regarded as a very favorable case. Procedure was cervix tandem and bare tubes in lesions; two weeks later abdominal hysterectomy; six weeks later vaginal bomb and low voltage cycle. Lesion rapidly recurred in the vaginal vault and throughout the pelvis, and patient died five months from date of first treatment.

I believe both of these patients would have remained free from cancer for a much longer time had treatment by irradiation only been given instead of combining it with hysterectomy, as both were very favorable cases.

Of the 129 primary cases treated in 1924, 38 had such extensive involvement of the cervix and adjoining structures that only partial or palliative irradiation with low voltage x-rays alone or in combination with surface application of radium per vaginam could be attempted. Twelve of these patients died during the year and the remainder will probably die this year. This group represents a hopeless proposition, at best we expect only temporary alleviation of symptoms, and it represents our heaviest casualty list.

TABLE III
SHOWING RESULTS OF TREATMENT IN SUCCESSIVE YEARS

	AD- VANCED CERVIX	BORDER- LINE CERVIX	EARLY CERVIX	RECUR- RENT CERVIX	PROPHY- LACTIC	CORPUS
1918	41 (4)*	17 (3)	4 (0)	35 (4)	8 (3)	7 (2)
1919	69 (3)	10 (0)	8 (4)	43 (5)	4 (3)	5 (1)
1920	92 (6)	12 (3)	13 (3)	37 (14)	10 (7)	5 (3)
1921	86 (12)	13 (8)	10 (7)	24 (5)	3 (3)	10 (6) 3 radium, 5 radium and hyst.
1922	80 (20)	27 (12)	16 (14)	29 (11)	2 (2)	15 (8) 3 radium and hyst. 11 radium,
1923	81 (28)	8 (8)	12 (12)	24 (12)	1 (1)	16 (13) 2 radium and hyst. 4 radium,
1924	91 (65)	22 (22)	16 (15)	18 (18)	2 (2)	9 (7) 3 radium and hyst.

*Numbers in parentheses indicate patients alive Jan. 1, 1925.

TABLE IV
SHOWING PERCENTAGE OF EFFECTIVE RADIATION AT VARIOUS DEPTHS

CENTIMETERS DEPTH	135 K. V. 4 MM. AL.	135 K. V. 5 MM. AL.	200 K. V. 1 MM. AL. CU.
	12" distance	15" distance	20" distance
0	100%	100%	100%
1	93.3	97.1	98.6
2	83.0	90.5	93.8
3	71.0	80.5	87.0
5	51.5	62.0	72.0
7	38.0	46.0	56.2
10	24.4	30.8	38.0
15	8.7	14.4	21.0

Surface portal of entry 250 sq. cm.

It is interesting to note that in the advanced group for 1922, 25 per cent are living for two to nearly three years.

CONCLUSIONS

1. Enough statistics on end-results of treatment of carcinoma of the cervix by irradiation are now available from reliable observers and clinics throughout the world, to indicate that hysterectomy is no longer necessary.

2. Evidence is accumulating to indicate that hysterectomy for carcinoma of the cervix even when combined with pre- or postoperative irradiation, or both together, may be a serious handicap to the patient's obtaining the full benefit of ray therapy.

3. There is at present not sufficient evidence to justify the treatment of adenocarcinoma of the corpus by irradiation alone in cases favorable for hysterectomy.

4. Evidence would seem to justify the careful, continuous, intensive treatment of all cases of carcinoma of the cervix with combined radium and roentgen therapy.

5. Prevention is better than cure; much more attention should be paid to the cure of cervical lacerations and inflammations.

6. Subtotal hysterectomy should not be done in the presence of a diseased cervix.

7. In subtotal hysterectomy for fibromyoma the specimen should be opened and the endometrium carefully inspected before the final decision to leave the cervix is made.

8. Surgery has definitely failed in the treatment of carcinoma of the cervix. Irradiation therapy is not ideal but represents a real epoch in the treatment of the disease.

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(For discussion, see page 870).

BENIGN PERFORATING DUODENAL CYST ARISING FROM THE VESTIGIAL REMAINS OF THE WOLFFIAN BODY

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OWING to the paucity of material and of case reports on neoplastic structures originating from the remains of the wolffian body, the following interesting case is presented:

The patient was a white woman, married, and forty-three years of age. Her chief complaint was a progressive weakness and anemia for the past fifteen months. No history of acute infectious diseases could be obtained. Her menstrual history was normal until four years ago when a menorrhagia and dysmenorrhea developed. These increased in amount and severity until a hysterectomy was performed in 1923. The early history was negative. The patient was delivered of a normal child fourteen years ago, and gave a history of one abortion of three months, prior to her full term delivery.

About six years preceding her present illness and two years after the hysterectomy, she complained of cramp-like, moderately severe pains in the right upper quadrant, not associated with the ingestion of food, nausea or vomiting. Numerous abdominal examinations were made, with the repeated diagnosis of "floating kidney." Obtaining no relief from medical treatment, surgical interference was resorted to, with the excision of numerous retroperitoneal cysts. The history states that one of these cysts was allowed to remain because of its difficulty in removal. Drainage was introduced and convalescence from this operation was comparatively normal except for a progressive menorrhagia developing after a few months. The abdominal incision healed by secondary intention, as the wound broke down twice before finally healing.

Because of the increasing severity of the menorrhagia and dysmenorrhea a hysterectomy was performed in 1923. A transfusion was resorted to on the day of operation and the convalescence was stormy throughout. The patient recovered completely and was in good health with no bleeding, no dyspnea and no pain in the right upper quadrant until November 1924. At that time, subject to an incident causing great emotional stress, the patient noted a progressive weakness, anemia, dyspnea and a most profound epigastric oppression, with much flatulence. There was no edema, no hemoptysis and no loss of weight. Abdominal examination presented a freely movable mass about 7 cm. in diameter in the right hypochondrium.



Fig. 1.

An exploratory incision was made on January 27, 1925 by Dr. J. G. Clark, preceded by cystoscopic and x-ray studies. The cyst, which was definitely retroperitoneal in character, was found attached by numerous adhesions to the anterior abdominal wall, pushing the duodenum to the right side and densely adherent to it. After releasing the adhesions and freeing the tumor at its lower border, it was discovered to be in direct communication with the duodenum through the posterior duodenal wall, and just beneath the mesoduodenum. About three inches of duodenum was excised, leaving the anterior duodenal wall intact and a duodeno-pyloroplasty then performed. The pancreas, which was normal, was in contact with the mass, and adhesions were released at this point also. The gall bladder and kidneys were normal. Convalescence was uneventful except for a small deep wound infection which promptly drained and healed. The hemoglobin, on admission, was 30 per cent and a blood transfusion of 500 c.c. was

given directly after operation. On discharge from the hospital the hemoglobin had risen to 43 per cent. At the present writing the patient is in excellent health.

Macroscopic.—The specimen consists of a rounded, cystic tumor 9 cm. in diameter. The capsule is glistening white, with occasional bluish areas and covered with adhesions. On cut section the specimen is found to be composed of numerous cystic spaces which vary in diameter from 2 mm. to 4 cm. The cyst contains, for the most part, clear material not unlike that found in cystadenoma of the ovary. The appearance of the capsule is also suggestive of this type of lesion. Attached to the dorsum of the tumor is 10 cm. of small intestine. Penetrating through the wall into the lumen of the intestine from the underlying tumor and occupying the lumen of the intestine, is a mushroom-shaped growth $3.5 \times 3 \times 1.5$ cm. extending from the neoplasm previously described. This is rather firm and papillary in type. Its appearance is not suggestive of malignancy. With the exception of the above-mentioned tumor, the intestine is normal.

The following is a pathologic report by Dr. C. C. Norris:

Microscopic: Sections from Portion of Tumor Projecting into the Lumen of the Intestine.—This is a mushroom-shaped lesion, the covering of which is necrotic and entirely denuded of epithelium. A zone of dense round-cell infiltration surrounds the area of necrosis. The stroma of the tumor is composed of loosely arranged fibrous connective tissue, which contains a considerable number of dilated blood vessels, some of which are thrombosed. In the central portion of the neoplasm are a number of gland-like spaces lined by a single layer of columnar epithelium. This epithelium stains normally in most instances but in some areas is somewhat irregular in its tinctorial reaction, evidently due to the existing inflammatory reaction. In some of the smaller cystic spaces the epithelium is cylindrical and at these points the cells contain deep staining basal nuclei. In many areas the epithelium is drawn up, forming fern-like projections. There is no reduplication, or breaking through of the basement membrane. In other fields the epithelium is more or less desquamated and shows the result of inflammatory change. Two of these gland-like spaces can be traced leading into the substance of the main tumor, following the surface of the tumor downwards to the intestinal mucosa. The latter tissue is found to present a moderately well-defined inflammatory reaction. As we follow this tissue away from the tumor the intestinal mucosa gradually becomes normal.

Numerous sections from the main tumor all show the same histologic picture, that is, a neoplasm, the surface of which is covered with adhesions. The walls are composed of fibrous connective tissue. Scattered throughout the tumor are many cystic spaces similar in general character to those found in the nodule in the intestine, except that many are larger and possess less inflammatory reaction.

No primordial follicles or their derivatives are observed in any of the slides. With this exception the tumor resembles an ovarian cyst and is obviously of wolffian origin. The tumor bears none of the characteristics of an intestinal neoplasm.

One recalls that, embryologically, the wolffian body becomes a sexual organ in the male and atrophies with descent in the female. In the course of these atrophic changes in the female, it can readily be seen that a few or many embryonal cells may escape complete or partial destruction, or become detached. It is conceivable for the heretofore described pathologic entity to be an endodermal parallel of a teratoma or dermoid cyst.

Clark,¹ in an exhaustive and detailed study of the embryo, found that modified peritoneal cells or germinal epithelium are histologic units of the wolffian body, although in the retrogressive stage of this body the cells are not dependent upon the parent, but manifest active, independent growth. The arteries are moderately constant in uniformity of arrangement. Atrophy begins in the upper part and progresses towards the caudal end of the wolffian body, the upper one or two series of arteries showing a decrease in size, followed by a complete atresia, having delicate white atrophic cords, which persist and may be seen lying beneath the peritoneum and covering the anterior surface of the kidney. In this embryonic retrogression the ovary occupies a groove between two organs: (1) the kidney, which is rapidly enlarging, and (2) the wolffian body, atrophying with descent, to the outer side. By the time the ovaries have reached the lower pole of the kidneys, the wolffian body remains only as a narrow tapering end, the cephalic portion having entirely disappeared.

McFarland² reports two cases: "One, by A. P. C. Ashhurst, was a cyst about the size of a fetal head, situated in the right side of the abdomen of a woman twenty-six years of age. It extended from the inguinal fossae toward the umbilicus, and was behind the peritoneum which slid over it freely. Microscopic examination showed it to be lined with a single layer of columnar epithelium that rested upon a thin layer of fibrillar connective tissue of which the wall of the cyst was formed. Ashhurst believes this to be derived from such a wolffian vestige, and bases the supposition on a somewhat similar case reported by La Pointe. It also occurred in a woman about thirty-four years of age, was of about the same size and was situated in the right flank, infringing upon the iliac fossa by its upper pole. It was unilocular, and when examined microscopically, after removal, was found to be lined with cuboidal epithelium and to resemble the glomerules or canals of the wolffian body as they appear in the parovarium."

Hinman, Gibson and Kutzmann³ report a case of a true cyst of the wolffian body, and base their deductions on finding primitive renal structures in the cyst wall. Symptoms of secondary compression phenomena were noted. The diagnosis was arrived at by exclusion and by a later pathologic study.

Cave⁴ reports a case of retroperitoneal cyst in a boy of three years. A bulging cystic tumor was found retroperitoneally, extending from the right hypochondrium to about the level of the false pelvis. Stomach, liver, gall bladder and both kidneys were found to be normal. Two daughter cysts were found and all were evacuated. The patient's general condition prohibited cystectomy.

It is of value to note here that, to date, in 1100 benign and malignant ovarian neoplasms examined in the University Laboratory, this

case has been the only one to even remotely suggest the vestigial remains of the wolffian body as its origin.

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107 S. TWENTY-FIRST STREET.

THE HISTOLOGIC INTERRELATIONSHIPS OF MENSTRUATION AND OVULATION*

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THE mere fact that the society has selected this subject for discussion emphasizes the growing realization of its fundamental importance to every gynecologist and obstetrician. The present paper will deal with the correlation between the two functions of menstruation and ovulation, although such a discussion of necessity entails a brief résumé of our present-day knowledge of the two processes.

Until very recent years our knowledge of the relationship between menstruation and ovulation was based almost entirely upon clinical evidence alone. There were some who believed that there is not the slightest relation between the two processes, either causal or chronologic. Those who felt that a relation of some sort exists were unable to explain the nature of the relationship. Some believed that ovulation takes place at the time of menstruation, others that it has no connection with the menstrual periods. From the confusion of views thus existing, it must not be assumed that clinical observations are not of considerable value when properly interpreted.

For example, the frequent occurrence of pregnancy, presupposing, of course, ovulation, during the amenorrhea so often noted during lactation may properly be interpreted as indicating the possibility of ovulation without menstruation. This would also be suggested by the not infrequent reports of cases of pregnancy before the appearance of the menstrual function or after its disappearance at the menopause. Furthermore, it is possible for pregnancy to occur during the functional amenorrhea associated with such endocrinopathies as adiposogenital dystrophy. I have seen this occur when amenorrhea

*Summary of illustrated address before the Brooklyn Gynecological Society, February 8, 1925.

had been present as long as three years. In such cases, as also in lactation, ovulation and corpus luteum formation are going on, even though menstruation is absent. Why does the corpus luteum not bring about menstruation, if it be present in the ovary? Presumably because it is antagonized by the new factor in the field, e.g., the pituitary element in adiposogenital cases, or the factor of the lactating breast in nursing women.

Even more weight, however, has in the past been attached to observations made during operations or at postmortem examinations. Conflicting reports were made by surgeons as to whether or not a corpus luteum is to be found in the ovary at the menstrual period. The unreliability of such observations from a purely technical viewpoint depends on the fact that it is not always possible to exclude the presence of a corpus luteum by mere inspection of the ovaries. As a rule, it is true, a mature corpus luteum forms a definite mound-like and at times almost a polypoid elevation on the ovarian surface. In some cases, however, the corpus is demonstrable only by cutting into the ovary, so that unless both ovaries are available for such examination, one cannot be sure that a corpus luteum is not present.

Far more important, and this is really the crucial error that invalidated most of the older investigations, the presence of the characteristic large yellow body, what we now call the mature corpus luteum, does not indicate that ovulation has just taken place, as was formerly assumed. The corpus of this type represents the acme of a development which began at the time of actual rupture of the follicle, and this development requires many days. Ovulation actually occurs long before the corpus reaches the fully developed stage which one ordinarily thinks of in connection with the corpus luteum. The thorough elucidation of the exact time relationship between the two processes is possible only by a careful day-to-day checking up of the histologic picture in the ovary with that presented by the endometrium. For the development of this method of investigation we are indebted to the German school of investigators, and especially to Meyer and Schröder.

It is now generally agreed that the actual rupture of the follicle probably takes place at a variable time, but most frequently at about the thirteenth or fourteenth day of the cycle. The first day of menstruation is, of course, taken as the first day of the twenty-eight day cycle. In some cases the rupture may take place as early as the fifth day, in others as late as the eighteenth. One of the early results of the histologic method of study was the demonstration that the corpus luteum in its earliest stages, immediately after the rupture of the follicle, is quite different in appearance from the corpus luteum of tradition. The latter is a striking structure, measuring usually

a centimeter or more in diameter, and showing a broad festooned wall of brilliant yellow hue. The early corpus, on the other hand, is quite inconspicuous, so that it is commonly overlooked. It appears as a flattened vesicle with a smooth, narrow, grayish or grayish-yellow wall. Contrary to the older views, the cavity is not filled with a blood clot, though slight bleeding may be seen.

The study of these early corpora lutea has yielded information, otherwise unobtainable, concerning, not only the time of ovulation, but also as to such important questions as the origin of the lutein cells. With regard to the latter, far more can be learned from the study of early corpora lutea than of corpora in a fully developed stage, where there is no longer any possibility of detecting transition pictures between the lutein cells and their progenitors.

In the present discussion, however, we are more particularly concerned with the histologic and chronologic relationships of the clinical, endometrial, and ovarian cycles of menstruation. The cycle of changes occurring in the endometrium at various phases of the menstrual cycle is now well established. Immediately following menstruation, for example, the endometrium presents the characteristic postmenstrual picture. The glands are straight, narrow, and collapsed; the stroma is quite compact; the epithelium is of a low columnar type. The postmenstrual stage is arbitrarily limited to the period of from four to five days after the cessation of menstruation. From day to day, however, there is a gradual development; the glands become fuller and fuller and develop a gradually increasing degree of tortuosity. The stroma is still quite compact, the cells showing only a slight amount of cytoplasm about the nuclei. The epithelium becomes a little higher than in the postmenstrual phase. This second stage is spoken of as the interval phase. The slow development of the endometrium in the postmenstrual and interval phases is probably due to the internal secretory influence of the growing graafian follicle in the ovary.

It is during the interval phase of the endometrial cycle that the matured follicle ruptures and discharges its ovum, which then begins its journey down the tube. As already stated, this event occurs at about the twelfth to the fourteenth day of the cycle, although there is much individual variation in this respect. The newly formed corpus luteum, in its earliest stage, the stage of proliferation or hyperemia, probably has no important endocrine function. The granulosa cells of the follicle undergo a gradual transformation into the characteristic lutein cells, and soon the still narrow lutein strip becomes permeated by thin-walled blood channels, which push into it from the larger vessels of the theca interna. It is this process which gives this stage its name—the stage of vascularization. Many of these new vessels

appear to break into the lumen of the corpus, so that at this time bleeding into the lumen is a characteristic feature. Usually, the hemorrhage is of moderate degree, forming a zone within the lutein layer, but at times it is quite abundant, so that the cavity is inundated with blood. In such extreme cases there is produced a so-called corpus luteum hematoma, and at times the hemorrhagic distention appears to be so great that the function of the lutein cells is destroyed. The mechanism of this and similar processes has been fully considered in a previous paper by Novak and Te Linde.

As the lutein zone in the normal corpus becomes more fully developed, there appears along the inner margin a delicate layer of newly-formed connective tissue, which shuts off the lutein zone from the lumen. The lutein cells are now large and active looking, forming a broad festooned layer of characteristic carrotty yellow hue. The corpus is now in the stage of maturity and there is no doubt of its functional value at this period, which comprises usually four or five days before the onset of menstruation.

Coincidentally with this maturation and obvious functional activity of the corpus luteum there appears in the endometrium a group of changes comprising the so-called premenstrual, pregravid, or secretory phase. The glands now show a marked degree of tortuosity, so that on longitudinal section they present a characteristic dentate or saw-tooth appearance. The division of the endometrium into the superficial compact and the deep spongy layers now becomes very clear. The compact layer contains chiefly the upper less dilated parts of the glands, between which are broad fields of stroma cells. The latter are distinctly larger than in previous stages, as a result of the acquisition of a more or less distinct cytoplasmic zone about the nuclei. They thus at times may suggest decidual cells in appearance, although the similarity is rarely so marked as to lead to mistakes in diagnosis. The epithelium shows a very striking change at this period, one which, perhaps more than any other, is distinctive of this phase. It now, for the first time, gives histologic evidence of secretory activity. It is low and pale-staining and its lumen border is frayed and irregular, as if the cells were melting away into a secretion of some sort. Furthermore, it is much flatter than in previous stages, approaching in this respect the characteristic flat gland epithelium of early decidua. These changes are especially noteworthy in the epithelium lining the glands, that on the surface being much less affected.

In the event of pregnancy supervening, the changes just described pass on by a very easy transition into those of early decidua. In fact, it is at times very difficult and perhaps impossible to distinguish a section of very marked premenstrual hypertrophy from one of

young decidua, unless, of course, such distinctly fetal elements as chorionic villi are demonstrable. It seems clear that the premenstrual or pregravid change is properly to be looked upon as one which prepares a suitable bed for the expected ovum. The latter, it will be recalled, has been thrown off from the ovary something like two weeks previously. It possesses a definite potential life span of presumably something like two weeks.

When the unfertilized ovum reaches the end of its trajectory, so to speak, the elaborate preparations made by the endometrium for its possible implantation are rendered useless. The endometrium then dismantles itself, and this destructive process is what we call menstruation. The immediate cause of the latter is probably the removal of the protective and up-building influence of the corpus luteum, which now ceases its development and begins to retrogress. On the other hand, there must be some new factor which thus stops the corpus luteum in its track, and the only one which can be thought of is the death of the ovum given off at the last ovulation. It seems remarkable that a single cell, large though it is, could exert such a profound effect, and yet such a conception fits in better than any other with known characteristics of the menstrual phenomenon, such as its remarkable periodicity, its absence during pregnancy, its definite relation to ovulation, etc.

The retrogression of the corpus luteum is accompanied by the retrogressive endometrial changes characteristic of menstruation. There has been much discussion in the past as to what actually occurs during this stage, and especially as to whether or not all or any of the uterine mucosa is cast off. The author, together with Te Linde, has only recently published a study of this entire question, with a review of the former work and a study of original material. We have convinced ourselves of the correctness of Schröder's view that loss of tissue is a constant feature of menstruation. I shall not here review our findings, except to say that on the first day of the flow the tissue loss may be only slight, but that by the second it is usually marked, so that often the entire compact layer and part of the spongy layer is lost. By the third or fourth day regenerative changes are well under way, and the surface epithelium is soon restored by outgrowth from the glands of the basal layer, which has not been disturbed. We also concluded, from our study of menstruating uteri, that the bleeding of menstruation is due in large measure to actual opening up of blood vessels, although diapedesis may play some part.

This brings our review of the ovarian and endometrial cycles back to the starting point. There are, of course, many other subjects of related interest which cannot be included in this brief presentation. For instance, the view stated in this paper as to the origin of the lutein cells is the one which is commonly accepted and for whose

correctness the evidence is almost complete, i.e., the view that the lutein cells of the corpus luteum are derived from the granulosa layer of the follicle. On the other hand, it is interesting to note that under certain conditions the theca interna cells may exhibit a lutein-like transformation. This is especially true under the influence of pregnancy, during which the lutein-like changes in the theca cells of atretic follicles give rise to the so-called interstitial cells, supposedly analogous to certain well-known cells in the male testis.

In certain types of abnormal pregnancy, more particularly hydatidiform mole and chorioepithelioma, the ovarian reaction to the pregnancy stimulus is exaggerated, so that the ovaries are the seat of multiple theca-lutein cysts. The cysts are of varying size and represent an increase in the size and number of atretic follicles. In the walls of the latter, even of follicles long since atretic and perhaps obliterated, the theca cells respond to the perverted pregnancy stimulus and are quickened into a lutein-like transformation. The characteristics of this ovarian change in hydatidiform mole and chorioepithelioma I have discussed in a previous paper.

The basis for our modern theory of menstruation, from what has been said, is the belief that ovulation is a necessary precursor of the process, i.e., that menstruation cannot occur without preceding ovulation. This belief is supported by a wealth of evidence, so that it is now accepted quite universally. Indeed, I know of no worth-while observations tending to discredit it except the recent ones of Corner upon a few of the series of monkeys which he studied from this standpoint. These few exceptions, however, have been quite plausibly explained by Meyer. Aside from this, however, they cannot be put up against the innumerable observations possible to every gynecologist to convince himself of the relation between menstruation and corpus luteum formation. A mature corpus luteum, for example, will invariably be found just before the onset of a genuine menstrual flow. As Meyer points out, however, it may be absent in certain nonmenstrual types of uterine hemorrhage, but such exceptions only go to prove the rule.

While the past two decades have added much to our knowledge of the physiology of menstruation, more than many centuries preceding, there is still much to learn. No doubt, too, it will be necessary to unlearn some of our present conceptions. It is one of the most fascinating and fertile fields in gynecology, and one which is bound up very closely with many subjects of everyday importance, such as the explanation of so-called endometrial implants, the etiology of so-called functional uterine hemorrhage, and the study of a number of interesting menstrual disorders associated with endocrinopathies of one form or another.

DELAYED CHLOROFORM POISONING FOLLOWING DELIVERY*

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ALTHOUGH the use of chloroform as a general anesthetic in surgery in this country has been practically discontinued, it is still quite freely used in obstetrics at the time of delivery. This anesthesia differs very materially from that given in a surgical case because the amount required is very small and the period of time for which it is necessary is comparatively short. Also, if drugs have been administered during the first stage, such as scopolamine and morphine, the amount of anesthetic required at the time of delivery is markedly diminished.

The administration of chloroform at the time of delivery has been justified on the basis that the parturient woman takes it more readily and more safely than any other and, in our experience, the incidence of asphyxia of the child is definitely less with this than any other anesthetic.

Well aware of the dangers of chloroform in prolonged anesthesia and in patients who are not suitable operative risks, our use of chloroform during labor is limited to that period in which the actual delivery takes place, which is usually no longer than five to fifteen minutes and a comparatively small amount is used. After the delivery of the child the anesthetic is usually changed to ether or nitrous oxide. No extensive repair work is carried out under chloroform anesthesia. On account of the damaging effect of the prolonged use of chloroform upon the liver it is, of course, not used in cases of late toxemia of pregnancy, or in labor unduly prolonged and during which time the patient has received only a small amount of nourishment or fluids. If chloroform is used with these restrictions, its dangers in obstetrical practice are reduced to an almost negligible minimum and its advantages stand out prominently.

The use of chloroform in obstetrical practice was first introduced by Sir James Y. Simpson. He employed ether in 1847 and replaced it with chloroform after he had discovered the anesthetic properties of the latter. Williams, in his latest textbook, still recommends chloroform as the anesthetic of choice in uncomplicated cases of labor. He believes that ether and chloroform can be used to good advantage in obstetrical operations and it makes very little difference which is employed. However, it is a well-known fact that the dangers incident

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to chloroform are markedly reduced at the time of labor but not during the puerperium, when chloroform is quite as dangerous as at other times. Exactly why this should be the case has not yet been definitely settled, but it is nevertheless a fact which has been established beyond doubt.

Williams outlines the method of administration and considers that the time for its administration is very late in the second stage when the head becomes palpable through the perineum. He emphasizes that the administration of chloroform should not be resorted to in the first stage except for exceptional indications.

If the precautions which Williams outlines and those that we have emphasized are followed, chloroform poisoning should never occur. However, delayed chloroform poisoning presents a clinical picture which is quite characteristic and which is briefly as follows: The patient may have nausea and vomiting following anesthesia or she may remain in apparently good condition for a day or two after delivery, when jaundice, with or without nausea and vomiting, develops and she passes into a torpid state, with occasional periods of excitement, and becomes comatose. This coma and jaundice may terminate fatally about the fourth or fifth day. However if proper treatment is instituted, as a result of rapid repair of the liver, this picture may in the course of two or three days after deepest coma, return to normal. The detailed clinical features can be best brought out by a detailed description of the cases that have come to our attention. The lesion which occurs in the liver from injury as a result of chloroform may vary from a moderate central fatty infiltration to a very marked extensive beginning central necrosis, and in fatal cases may involve a considerable portion of the lobules.

Before taking up the report of the cases, it may be of interest to review briefly the experimental work of Whipple, Opie and Alford, and more particularly, Graham. These investigators have clearly demonstrated the effect of chloroform on the liver cells and to what extent this action varies under different circumstances. Graham has shown that the process consists of an autolysis of the liver cells which may lead to more or less destruction of the secretory portion of the liver, and is more marked about the central veins. Opie and Alford have shown that the administration of fat, which is stored presumably in the liver, increases the susceptibility of that organ to the injurious action of the chloroform. These investigators feel that the solubility and diffusibility of chloroform suggest that the fat of the liver cell determines the fixation of the chloroform and occurrence of necrosis about the central vein, where a great deal of fat accumulates. They showed further that carbohydrates protect the body proteins from disintegration and diminish liver necrosis, whereas the administration of fat may carry great danger. When death occurs within six to eleven days after the onset, kidney lesions may be evident, both necrosis and fatty degeneration of the renal tubules are present and casts are abundant. This necrosis of the renal tubules and loops of Henle show most involvement in the medullary striae and in the lowermost part of the cortex and in the immediately adjacent subcortical part of the medulla. Opie and Alford state that animals which have lived less than four

days after chloroform poisoning have inconspicuous lesions and that liver necrosis is the characteristic lesion of delayed chloroform poisoning in mammals. Graham presents the most logical explanation of the cause of chloroform poisoning. In his analysis of the factors involved, he believes that this arises from the production of hydrochloric acid with consequent necrosis of those liver cells coming first in contact with the acid, and that other acids, as lactic acid (from tissue asphyxia) or perhaps phosphoric acid from oxidation of phosphorus *in vitro*, may be formed. Ether and chloral hydrate do not produce liver necrosis, but only edema and fatty infiltration to a limited degree.

Prolonged chloroform administration causes edema, fatty infiltration, multiple hemorrhages and necrosis of the central portion of the liver lobule. Chemically pure chloroform exposed to sunlight at room temperature is oxidized into phosgene (COCl_2) and hydrochloric acid (HCl). Phosgene in the presence of water is decomposed into CO_2 and two molecules of HCl . (COCl_2 plus H_2O equal CO_2 plus 2HCl). Therefore, one molecule of chloroform is oxidized in the presence of water and three molecules of hydrochloric acid may be formed. Graham produced necrosis of the periphery of the liver lobule after injecting hydrochloric acid in suitable concentration. This he attributed to the fact that the periphery of the lobule comes first in contact with the acid.

Graham submits the following reasons as favoring his views of acid poisoning: (1) Hydrochloric acid produces the characteristic features of late chloroform poisoning except for a different distribution in the liver. (2) Necrotic liver areas produced by the various substances under discussion gave an acid reaction to neutral red. (3) Sodium carbonate, 1 per cent, in hypertonic sodium chloride (N. 1.4 per cent) solution, markedly inhibits the production of the lesions. Infections, like all other conditions which remove glycogen, increase the susceptibility of the animal to the toxic effect of chloroform. This conclusion was likewise reached by Opie in his work. In a paper entitled *The Resistance of Pups to Late Chloroform Poisoning and its Relation to Liver Glycogen*, Graham found that these were relatively immune to central liver necrosis after chloroform, probably due to the high glycogen content of the liver. This content in one well nourished, twenty-four-hour-old pup showed 9.07 per cent glycogen in the liver. Graham found that pups could readily be made to show central liver necrosis if prior to chloroform administration they had been starved or starved and made diabetic with phloridzin, and that feeding carbohydrates to adult animals lessened their susceptibility to the production of liver necrosis by chloroform. Graham's work offers a plausible explanation of the etiology of the pathologic changes in certain of the toxemias of pregnancy as pernicious vomiting, acute yellow atrophy, chloroform poisoning, etc., since most of these occurrences followed a period of more or less starvation with the resultant acidosis and possible liberation of free acid within the body.

The following three case reports of chloroform poisoning are submitted.

CASE 1.—Mrs. H. S. W., age twenty, white, gravida i, entered hospital at full term, May 25, 1915. No history of nausea or vomiting during pregnancy. When six weeks pregnant, she had an acute pain in the right lower quadrant which subsided after a few days. Headaches had been rather severe throughout pregnancy; edema of feet during the last two or three months; some urinary frequency and slight albuminuria throughout pregnancy, although lessening during the latter part. The patient had had irregular labor pains for five days before admission to the hospital. Her height was 63 inches, weight, 90 pounds; umbilical circumference 86 cm., McDonald's measurement 37 cm. Pelvis rachitic, flat. Catheterized speci-

men of urine clear, brown, specific gravity 1020, acid reaction, few white blood cells, hyaline and granular casts. No sugar, no acetone, faint trace albumin.

During a period of seven hours a total of one-fiftieth grain of scopolamine and one grain of narcophin was given. Twenty to thirty drops of chloroform were administered for delivery, which was terminated by mid-forceps. Total duration of labor was one hundred and eight hours; first stage one hundred and six hours, second stage one hour and forty minutes, third stage twenty-seven minutes.

The following day the patient was slightly jaundiced; vomited several times during the day; vomitus bloody, of coffee grounds appearance, although liquid. The patient had had only liquids since delivery. She was perfectly conscious; complained only of slight vomiting. Pulse rapid, of good volume. Proctoclysis of sixteen ounces of normal saline solution was given every four hours. Catheterized urine: brown, specific gravity 1023, acid, no sugar, heavy trace of albumin, few hyaline casts, many white blood cells, fat globules; bile test strongly positive. Acetone and indican negative.

On the second day after delivery morphine was administered at 3:30 A. M. for epigastric pain. Liver dullness from fourth rib in midmammary line within 2 inches above costal margin. That afternoon jaundice was marked and patient had been semiconscious for three hours. Onset sudden with vomiting, jaundice, and on-coming coma with apparently diminished liver dullness. Urine markedly concentrated and contained small amount of bile. Abdomen very slightly distended; suspected acute yellow atrophy of liver. Dextrimaltose, 15 grams with 7 ounces of water were given every four hours as rectal feeding. Hypodermoclysis was started. Temperature never above 100° F., lochia scant, no marked odor. At 7 P. M. she vomited continually, black, sticky material; pulse rapid but with good tension. Liver dullness appreciably lessened, being about 2 inches in width and quite tender. Lower abdomen tender. Blood pressure 145/75. At 9 P. M. condition was growing steadily worse, no distention and no muscle spasm. White blood cells, 42,200, polymorphonuclears 87 per cent, small mononuclears 10 per cent, large mononuclears 3 per cent. Red blood cells 964,000. Guaiac in vomitus was markedly positive, coma deepened steadily. Urine output 600 c.c. in the forty-eight hours following delivery.

Third day after delivery: 4:15 A. M., temperature 98° F., pulse 180, respiration 54. Liver dullness represented by ribbon 2 inches wide, running across level of sixth rib. Spleen not enlarged. Skin of a definite yellow tint. Eyeballs continually rolling about with a tendency toward internal rotation. Pupils did not react to light, widely dilated. Occasional twitching of various muscles of the body. At 4:45 A. M., pulse almost imperceptible, respirations irregular at times; 6:15 A. M. white blood cells 38,400, hemoglobin 60 per cent. Radial pulse imperceptible. At 10 A. M. the patient died. Temperature 103° F.

Autopsy Report.—Lungs: weight 475 grams. Sclera icteric. On surface of lower lobe of right lung were plum-colored areas, on section, suggesting hemorrhage into substance of lung; also ecchymotic spots 2 or 3 mm. throughout lung tissue; no evident consolidation. Bronchi contained reddish brown, viscid material, similar to that which is present in the stomach.

Liver: Weight 950 grams. Seemed small. Surface smooth and of pale bright yellow color marked in many spots by small red spots corresponding to the centers of the lobules. On section, the tissue varied in appearance; it was partly yellow marked in some places by red spots, corresponding to the centers of the lobules. Elsewhere the centers of the lobules were marked by yellow areas, surrounded by a circle of red. (Midzonal necrosis.) Outside the red circle the tissue was yellow. In consistency, it was fairly firm. Microscopically, well defined midzonal necrosis of cells, approximately one-third the radius of the lobule and midway between the central vein and portal space. In this zone the liver cells were hyaline. A large amount of fat was present in the center of the lobule and just outside the necrotic

zone, but scant next to the portal space. Gall bladder contained greenish black bile.

Spleen weighed 125 grams. Small, firm; on section: homogenous, deep red in color. Malpighian bodies inconspicuous. Stomach contained an abundance of reddish black viscid material, beneath which were few ecchymoses and erosions of mucus membrane. Duodenum, jejunum and upper part of ilium contained material similar to that of stomach contents. Kidneys weighed, left, 130 grams, right, 125 grams. Capsule stripped easily. On section, surface was of cloudy gray-red color, markings inconspicuous, glomeruli not seen. Some of the pyramids were marked by yellowish striations, most conspicuous at apices.

Left ovary and tube showed old adhesions closing fimbriated extremity of latter. Right adnexa negative. Uterus: surface smooth, showing a group of ecchymoses, muscle soft and yellowish; cavity widely patent and contained a large blood-clot in upper part and in lower part, a small amount of yellowish gray pus-like fluid; smears from which showed great numbers of groups and masses of cocci. (Gram-positive.) Adherent to the surface was a thin layer of exudate; some inconspicuous injection of the uterine wall immediately below the surface.

Bladder, posterior wall and adjacent cellular tissue edematous and had an area covered by grayish pseudomembrane.

Diagnosis: Puerperal endometritis, central and midzonal necrosis of the liver; jaundice, fatty degeneration of the kidneys; pseudomembranous cystitis, hemorrhagic erosions of the stomach; healed perioophoritis and salpingitis, left, and thickening of mitral valve. Cause of death in this case was central and midzonal necrosis of the liver due to chloroform poisoning.

CASE 2.—Mrs. M. C. K., twenty-three years of age, gravida i, entered hospital at full term on September 14, 1915, having slight labor pains. She had vomited frequently during first three months; vomited blood twice. She had erysipelas when eight years old.

During a period of sixteen and one-half hours, the patient received a total of one grain of narcophin and one-nineteenth of a grain of scopolamine in twelve doses. She was examined under chloroform anesthesia and diagnosis made of hydrocephalus. Delivery by craniotomy of a congenital hydrocephalus followed by version of a macerated stillborn fetus, at 1 P. M., September 16, 1915.

The next night, following delivery, the patient complained of considerable headache and backache; vomited a yellow fluid once; was nauseated the whole day, very restless and slept very little; slightly jaundiced.

Second day after delivery: The patient was semiconscious, and refused everything by mouth. Sclera and skin icteric. Liver 3 cm. below costal margin in right midmammary line. Blood pressure 118/70.

Fourth day after delivery: Unable to arouse patient enough to answer questions. Blood pressure 142/80. Red blood cells, 4,500,000; white blood cells, 22,000; leucocytes, 89 per cent; lymphocytes, 10 per cent; eosinophiles, 1 per cent. Liver dullness from lower border of fifth rib could be felt as a firm organ extending three finger breadths' below costal margin. Spleen not palpable.

Fifth day after delivery: Blood pressure 160/78. No response to painful stimuli; muscular twitching of extremities. Stomach contents were guaiac positive. Cheyne-Stokes' respiration at 5 A. M., pulse good. Blood pressure 142/78 at 1 P. M. Regular moaning, coughing, and twitching of arms and shoulders. Liver outline unchanged.

Seventh day after delivery: The patient was in absolute coma. Blood pressure 138/80. Chest had many whistling râles. Liver firm and enlarged, lochia dark and foul smelling. Respiration labored.

Twelfth day after delivery: Less jaundice, liver firm and two fingers' below costal margin.

Seventeenth day after delivery: Patient improved rapidly until that afternoon when temperature arose to 102.6° F., with pain in abdomen. Pelvic findings negative. Red blood cells, 3,920,000; white blood cells, 14,560.

Twenty days after delivery: Temperature arose to 105° F. Blood smears negative for malaria. Urine showed much pus and colon bacilli; blood culture positive for colon bacillus. She was given sponge baths, forced fluid intake, liquid diet and ten grains of urotropin every four hours.

Thirty days after delivery: White blood cells, 8,800; blood pressure 112/64.

Thirty-three days after delivery: Blood culture was negative. Patient sat up.

Thirty-nine days after delivery: Liver at costal margin. Patient discharged.

Complications: Chloroform poisoning, pyelitis (*Bacillus coli*), and septicemia puerperium. (*Bacillus coli*.)

CASE 3.—Mrs. E. M., thirty-one years of age, white, in her second pregnancy, the first having terminated in a ruptured ectopic pregnancy five years before. Her pregnancy had been stormy because of active contractions and profuse and frequent bleeding during the first half of gestation, during which period the patient spent most of her time in bed to avoid the threatened miscarriage. Pelvis normal. Cervix was long and rigid; position of fetus right occipitoposterior, presenting part movable at inlet, not engaged.

On February 21, 1923, patient had two ounces of castor oil, a long walk, and a warm bath at bedtime. Slight contractions began at 1 A. M., February 22. She entered the hospital at 4 A. M. and at 8 A. M. had a vaginal examination under gas-oxygen and one finger was forced through the cervix to determine a definite diagnosis as to the question of an intra or extrauterine pregnancy at term.

Failing to induce labor by means of fractional doses of pituitary extract, a Voorhees bag was introduced under complete gas-oxygen anesthesia, three days after admission to the hospital, during which time the patient took comparatively little food because of nausea. After a labor of twenty-four hours during which time the patient received $\frac{1}{8}$ grain of morphine and a total of $\frac{1}{4}$ grain of hyoscine hydrobromide in thirteen doses, over a period of fourteen and three-fourth hours, delivery was effected by the Scanzoni maneuver in midpelvis. Throughout labor, the patient vomited frequently, retained little, if any, fluid. Placenta extracted manually because of free bleeding. Hypodermoclysis of 1000 c.c. normal salt solution given. Pulse rate 140, of poor volume.

Three hours before delivery, the patient was examined under chloroform anesthesia. She received approximately 50 to 60 c.c. of chloroform during examination and delivery. Shortly after delivery, the patient's abdomen was much distended; vomited at frequent intervals. Gastric lavage gave temporary relief.

First day after delivery the patient was still nauseated and vomited. Saline hypodermoclysis, 2000 c.c., given during the day.

Second day following delivery, the lochia was very free and offensive; patient restless and talked irrationally. Urine bloody. Condition worse. Blood transfusion of 500 c.c. given and oxygen administered at intervals. Marked abdominal distention, jaundice and small liver dullness. Urinalysis, acetone strongly positive, pus abundant, few red cells, few granular casts, motile bacilli, specific gravity 1012, cloudy, acid, heavy trace of albumin. No sugar, diacetic acid, or indican.

Third day after delivery, temperature was 102° F., pulse 126, respiration 28. Patient in coma, pulse weak and irregular. After no response from stimulants a second blood transfusion of 500 c.c. was given. Patient died three hours later.

An analysis of these three cases shows that all had long exhausting labors lasting over a period of several days and during this time comparatively little food was taken, thus fulfilling the experimental requirements for liver injury, previously mentioned, which left these

patients peculiarly susceptible to chloroform poisoning. In Cases 1 and 3 a reduction in the size of the liver, as outlined by percussion, was definitely present. The starvation, dehydration and general state of exhaustion were all contributing factors. The fairly constant time for the appearance of symptoms of toxemia, first becoming evident two days after delivery also represents a typical picture similar to that obtained in chloroform poisoning in animal experiments.

In Cases 1 and 2, bacterial organisms were demonstrated; in the former, in uterine and the latter, in blood cultures, which infections render such patients more susceptible to chloroform poisoning. No blood culture was taken in Case 3, although motile bacilli were present in the urine. Opie has shown that the combination of bacterial and chemical poison increases the extent of liver damage.

In view of these results and especially because of the work of Graham and Opie and Alford, the following conclusions are reached:

While we still feel that chloroform is a safe anesthetic in obstetrics, there are cases such as those reported above, in which it is highly toxic and may be the direct cause of death. These cases satisfy all the conditions necessary for the production of chloroform poisoning in experimental animals; namely, starvation and depletion of the glycogen stored in the liver, due to lack of food taken during period of labor plus the utilization of the reserve by the physical exertion of a prolonged labor. We should guard against the production of these conditions by supplying the patient with carbohydrates by mouth, by rectum, or intravenously. When these conditions are present, chloroform should not be used, ether or nitrous oxide being the anesthetic of choice in such cases. If in spite of these precautions, we have a case of chloroform poisoning or any other condition associated with liver necrosis, we should give carbohydrates and alkalies, preferably glucose intravenously, to allow the liver to recuperate more readily.

The histologic and clinical picture of chloroform poisoning is the same as for any other diffuse systemic poisoning showing most marked involvement in the liver area nearest the central vein. Undoubtedly certain cases formerly considered as acute yellow atrophy of the liver following delivery have been instances of chloroform poisoning.

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WALL BUILDING.

OVARIAN TUMORS COMPLICATING PREGNANCY, WITH A REPORT OF SIX CASES

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WHEN writing of ovarian tumors complicating pregnancy, one must frequently quote McKerron who has collected a large series from the literature (1920 cases). He furnishes valuable information concerning treatment in the past, when pregnancy was allowed to run its course without interference. In 720 such instances the maternal mortality was 21 per cent and over one-half of the infants were lost. In Piering's collected material, 39.2 per cent of the mothers and 67 per cent of the newborn died.

Today, efficient surgical interference has so reduced the death rate that Marshall finds a maternal mortality of only 3.3 per cent when operated upon during pregnancy, and 5 per cent after laparotomy at term. DeLee considers these figures too low, for "many fatal cases are not reported." Puech found a 6 per cent maternal and a 23 per cent fetal death rate. Even with improved surgical treatment an ovarian tumor may be one of the most serious complications of pregnancy. Williams says that serious trouble of one kind or another occurs in at least one-fourth of those present during labor and the puerperium.

The frequency of the association of ovarian tumors with pregnancy is difficult to determine. Rosenthal encountered 3 in 1400 cases, while statistics from McKerron are as follows:

Flaischlen	5 times in 17,832 pregnancies.
Löhlein	2 times in 1,300 pregnancies.
Tarnier	1 time in 1,738 pregnancies.

These figures would make the incidence about once in 2024 cases. Undoubtedly a false impression of the rarity of this complication is gained from these statistics. It is difficult to determine the incidence. Two of my cases occurred in my first 500 private cases; Dr. Foster Cary, of Denver, encountered three in approximately 500 consecutive cases. The four others in my series were referred. The combination of ovarian tumor and pregnancy is much less frequent than that of myomata, but surely it is not as uncommon as one is led to believe.

Considering the frequency of new growths of the ovary during the childbearing period, it is evident that their presence predisposes to sterility.

Theilhaber found that 40 per cent of his cases with ovarian cysts were nulliparous. Simpson states that one of every ten married women is sterile, while of those with

known ovarian disease, one of every three or four never become pregnant. West, in compiling ninety-four of his own, with ninety-seven of Scanzoni's cases, reached the same conclusion. There are however, many instances of repeated pregnancy on record where both ovaries have been the seat of a tumor.

Regarding the kind of tumor, to quote McKerron again, he found in 862 cases that "simple and multilocular cysts occurred in 68 per cent, dermoids in 23 per cent, malignant neoplasms in 5 per cent, fibromata and solid adenomata in 2 per cent." Puech, in 1362 cases, encountered 27 per cent dermoids, while Spencer observed dermoids in 12 of his 41 patients. This type of tumor is evidently less prone to cause sterility as they constitute but 10 to 15 per cent of all ovarian neoplasms. Olshausen, 4 per cent in 2275 cases; Pfannenstiel, 10 per cent; Lippert, 10.3 per cent; Kelly, 16.2 per cent. During pregnancy, taking the incidence of McKerron, Puech, and Spencer, 29.3 per cent were dermoids.

Koucky, in 100 cases of dermoid cysts, found that of eighty who had married, 17 had had no children, of these, 3 had been married two years or less; 9 had large fibroids; while in 5, the dermoid cyst was the only gross pathology and may have been the cause of sterility.

Being usually small tumors, dermoids have a tendency to remain in the pelvis, about 3 in 5, (McKerron) and so cause obstruction during labor. They are also the type of cysts most often infected and if ruptured by pressure of the descending part, their irritating contents cause a peritonitis.

Ovarian tumors produce abortion or premature labor in from 14 to 20 per cent according to Graefe and in 17 per cent according to Remy who studied the results in 321 pregnancies. This is brought about by incarceration of the tumor or uterus within the pelvis, by infection, twists of the pedicle, adhesions, and by pressure from large tumors.

It is true that the majority of women go on to term without the knowledge of the existence of a tumor; only 18 were suspected in McKerron's first series of 183 cases. The symptoms are variable and uncertain; when present, they have been described as being dependent upon the size and position of the tumor or due to complications. About 25 per cent of all ovarian tumors occurring during pregnancy lie in the pelvis and are seldom discovered till after the onset of labor; of 327 cases (McKerron) one-fourth occupied this position and of these, 116 were dermoids. Here bladder symptoms, difficult and painful urination, or indications of pressure on the rectum, result. Many histories show that pain in the pelvis has led to an examination with the discovery of a tumor. Often extrauterine pregnancy has been suspected and it is interesting to note that the combination of ectopic pregnancy and ovarian tumor has been reported by Norris, Harrigan, and others.

Tumors which rise out of the pelvis, provided there is no complication, such as torsion, usually give no symptoms. If large, there may be discomfort and a mild peritonitis from pressure and irritation causing pain, or if very large, dyspnea and palpitation are common complaints. The complications attending an accident to the tumor will usually make themselves sufficiently manifest to demand prompt surgical attention, often, however the correct diagnosis is not made. In only 18 of the 52 cases reported by Heiberg, was the tumor diagnosed before the abdomen was opened.

Ovarian neoplasms are more easily detected during the early months of gestation when they are felt posterior, anterior, or to one side of the uterus. The tumor is often mistaken for the fundus and goes undiagnosed, or if large, it may conceal the uterus and pose as the pregnancy. Small cysts later in pregnancy may slip up under the liver or spleen and so avoid detection.

It is interesting to note some of the diagnoses that have been made; they indicate that proper interpretation may be difficult. Near term they have been mistaken for the fetal head, a transverse position, twins, hydramnios, a double uterus, a fibroid, abdominal pregnancy, ascites, cysts of the liver, a cystic kidney, and tuberculous peritonitis.

Often not until there is interference with the descent of the fetus, is an obstructing mass suggested, and DeLee states that cysts have been taken for the head of a twin child and forceps applied or a fibroid and enucleation attempted, or a prolapsed kidney, a full rectum and a hematoma.

Contrary to what is sometimes claimed, pregnancy rarely influences the growth of the tumor. Spencer Wells reports two cases in which, through several pregnancies, the tumor remained the same in size. Occasionally a rapid increase is noticed but is usually to be explained by some complication, as from vascular adhesions, the influence of torsion of the pedicle and hemorrhage.

Historically, the operation for the removal of cysts with pregnancy is interesting in that the first six operations were done in ignorance of the accompanying pregnancy; had the true condition been known it is doubtful that they would have been undertaken. Pregnancy was supposed to produce "a hydremic condition of the blood and an increased arterial tension calculated to cause hemorrhage." The danger of abortion was considered so great as to practically contraindicate operation and suppuration more often followed (McKerron).

Burd, an Englishman, in 1846, operated upon a woman three months pregnant, for an ovarian tumor. Abortion followed but the patient recovered. Marion Sims removed a large ovarian tumor and, to his surprise, found the uterus enlarged to the size of a three months' pregnancy. Recovery was uneventful, and this was the first instance in which pregnancy continued to term and a living child was born.

The older writers ignored consideration of the tumor, advising palliative measures until some complication arose during pregnancy or labor. Most authors now agree that during pregnancy the tumor should be removed as soon as diagnosed. The advice of McKerron, given nineteen years ago that, "all the available evidence points to the advisability of early operation" is more justifiable now than then. DeLee believes that one must individualize, that there are exceptions, as for example, with a small tumor freely movable high in the abdomen; and aged primipara desirous of a child, with a slight hope of a further pregnancy; or a double ovarian tumor in a woman wishing a child. Personally, I think it is doubtful whether even under these conditions there would be more chance of a successful outcome by deferring operation.

Abortion or premature labor followed operation in 19.47 per cent of Heil's collected cases and in 16.5 per cent of those of Puech. Flatau, in 284 ovariectomies, reports interruption of pregnancy in 17.2 per cent, 2 of these followed ten and twelve weeks after operations which, if deducted, would make his figure 15.1 per cent. In several instances, also, abortions resulted from causes other than operation. It has already been stated that this accident occurred in 17 per cent (Remy) of cases without operative interference.

The time of operation is undoubtedly a factor and it is quite universally agreed that interruption of pregnancy results more frequently if operation is done during the second half than during the first half of gestation. So, when the tumor is discovered in the latter half, it is urged by Spencer and other English surgeons to defer operation, unless there are definite reasons, until the child is viable.

It is also advisable to wait until after the first month or sixth week of pregnancy, for during the first few weeks at least, the life and growth of the ovum are dependent on the presence of the corpus luteum. Should the removal of the

tumor include the corpus luteum, abortion would follow. It is now believed that the placenta assumes this function after the first weeks of nidation. (R. T. Frank.)

Grosse, in 53 bilateral oophorectomies, found 25 per cent of abortions in the first two months of pregnancy, 11 per cent in the third, and 12 per cent in the fourth months. "In spite of these figures he still expresses doubt as to the importance of the corpus luteum early in nidation." (Frank.) Petri thinks that implantation of the ovum and continuance of pregnancy are not dependent upon the corpus luteum and cites a case of Essen-Müller who extirpated both ovaries with the corpus luteum; delivery at term followed 260 days after operation.

The accompanying table from McKerron's book is instructive regarding the number of interrupted pregnancies and the month of operation.

MONTH OF PREGNANCY	NUMBER OF OPERATIONS	PREGNANCY INTERRUPTED	EXCLUDING COMPLICATIONS
2	28	6—20.7 %	5—18.5 %
3	60	9—15 %	5— 8.8 %
4	60	7—11.6 %	3— 5.3 %
5	38	8—21 %	2— 6.2 %
6	22	8—36.3 %	4—22.2 %
7	15	5—33.3 %	3—20.0 %
8	7	4—57.1 %	4—57.1 %
9	6	0—00 %	0—00 %

Williams states that during the last month of pregnancy, it is usually advisable to postpone operation until term for the reason that a fresh abdominal cicatrix is ill-adapted to the strain of labor.

During labor the cyst may be in the abdomen out of harm's way or be so small or so compressible as to allow the child to pass or only a malposition or inertia result; yet it may give rise to the following very serious consequences, injury to the cyst with a subsequent necrosis, rupture, and peritonitis, hemorrhage into the cyst (Jones-LeConte) or tearing of the pedicle. Rupture of the cyst may be of no special danger unless it be a dermoid or malignant neoplasm. The tumor may be forced through the rectum or vagina. Bonney reports a dermoid being forced through the rectum and mentions six other cases collected by Haultain. Michaelis reports one case. Haultain reports five cases where the tumor was forced through the vaginal wall, and Kemp describes another such instance. DeLee states that, when pressed upon by the presenting part, a cyst becomes so hard as to resemble a fibroid, and if fixed, as in one of his cases, may be mistaken for a tumor of the pelvic peritoneum.

The treatment during labor, in this country, is by abdominal operation. Forceful delivery, along side of the tumor, with forceps, by version, or craniotomy, is unqualifiedly condemned by all. A former procedure and one still advised by some is the careful reposition of the tumor with the patient in the Trendelenburg, or knee-chest position. Under an anesthetic, the mass is, if possible, worked out of the pelvis and the child delivered by version or with forceps. Because of the likelihood of injury to the tumor, or complication during the puerperium, immediate laparotomy is then advised.

The replacement of the tumor may be impossible and the cyst be already injured; should cesarean section become necessary vaginal manipulation has made infection probable and if laparotomy is to be done immediately or "at least within twenty-four hours" after delivery, it is preferable to remove the tumor at the time of labor and complete the delivery by cesarean section.

Bland-Sutton, Spencer, DeLee, and others prefer after the removal of the tumor by

laparotomy, that the abdomen be closed and the delivery accomplished by nature, or at most, through assistance with forceps. Williams advises that the removal of the tumor be accompanied by a cesarean section, stating that the patient should not be submitted to the strain of labor. There are a number of instances where the tumor is intraligamentous or lies behind the uterus where cesarean is necessary before it is accessible.

Another procedure which was strongly advised at one time was puncture of the cyst through the vagina, followed by delivery and subsequent removal of the cyst. Statistics collected by Jones, in 1913, show that this method is extremely dangerous; the peritoneal cavity is contaminated and the mortality is even greater than that of expectant treatment,—29 as against 25 per cent.

Dührssen, Wertheim, in fact most Germans, recommend the vaginal route, not only in infected, but in all cases where the tumor blocks the pelvis. An incision is made over the most prominent part, the cyst evacuated, grasped with a tenaculum, drawn out and the pedicle ligated; if the pedicle is not accessible or if the head follows down, the sac is fixed to the vaginal opening by suture, or it is lightly packed with gauze until the delivery. At times the pedicle cannot be ligated, the tumor is brittle or solid, or cannot be drawn out. Williams, Spencer, Kerr, Hofmeier and most American and English surgeons prefer the abdominal operation. If infection is present, drainage is accomplished through the vagina.

Lea contends that 50 per cent of tumors of the ovary which are present during the puerperium cause grave symptoms. This period is probably the most dangerous because of injury to the tumor at the time of labor or from torsion with the resultant hemorrhage or gangrene and infection. In 29 cases collected by Remy, 11 instances of torsion were encountered in pregnancy and 18 during the puerperium; of the cases collected by McKerron, 12 per cent occurred during pregnancy and 22.7 per cent followed labor.

The following six cases have been personally observed.

CASE 1.—Primipara, aged twenty-six years, had had five months previously, a therapeutic abortion for severe vomiting. When seen by me she was again six weeks' pregnant, vomiting was severe and she had made up her mind that a repetition of the operation was necessary. Posterior to a slightly enlarged uterus, a tumor the size of an orange was found. Operation was advised and it was strongly suggested, for its mental effect, that removal of the tumor would stop the nausea.

The tumor, a dermoid, arose from the left side, with a short pedicle. Moderate nausea and vomiting continued for about two weeks after the operation but was controlled by rectal feeding with glucose solution, and pregnancy was uneventful with a living child at term.

CASE 2.—Primipara, aged twenty-six years, about three months pregnant. The patient complained of nervousness, mental confusion, and a blurring of vision, though the reason for consultation was an excessive enlargement of the abdomen. The abdomen was fully the size of a full term pregnancy; palpation showed an enlarged uterus, two fingerbreadths above the symphysis, with a cystic tumor extending from just below the ensiform to well below the umbilicus, and filling the right iliac fossa.

Because of its large size, it is remarkable that this cyst had not been observed before. It is possible that pregnancy had stimulated its growth, though it is more probable that projecting partly into the abdominal cavity, it had been entirely displaced upwards by the pregnant uterus.

At operation a large pseudomucinous cyst was removed; it had a long pedicle arising from the right side, its weight was thirteen pounds. Convalescence was uneventful with a living child at term. Four years later there was another uncomplicated pregnancy and labor.

CASE 3.—A primipara, aged thirty-three years. No internal examination was made in the early months and nothing was suspected in the way of an ovarian tumor until the tenth day of the puerperium when sharp pains on the right side of the abdomen, on a level with the umbilicus, developed. Here a rounded mass, distinct from the uterus, could be felt. The pains had been present about twelve hours but were becoming considerably less severe. There had evidently been a slight twist of an ovarian cyst pedicle. The patient desired to put off operation until a later date. As close observation was possible, this was postponed until the sixth week of the puerperium when a parovarian cyst, the size of a small orange was removed; there was a distinct pedicle arising from the right mesovarium; the right ovary was not involved in the cyst; it contained the corpus luteum of pregnancy

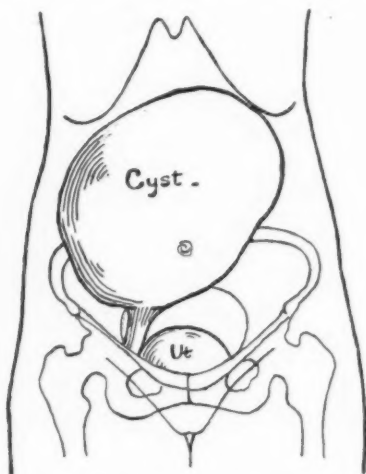


Fig. 1.—Case 2.—Three months' pregnancy with pseudomucinous cystadenoma, 13 pounds, long pedicle.

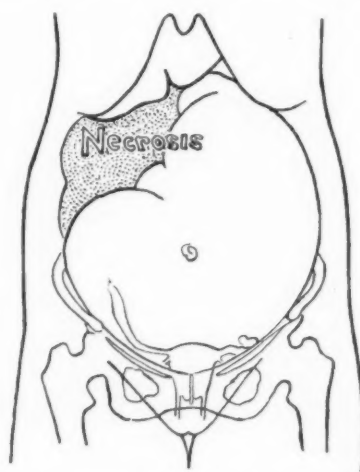


Fig. 2.—Case 6.—Large pseudomucinous cystadenoma, 27 days postpartum, entirely fills abdominal cavity, with rupture and necrosis in upper right hand portion; adherent to under surface of liver. Arises from pedicle on right side.

and as the fallopian tube stretched across the circumference of the cyst, it was evidently an instance of internal migration of the ovum.

A subsequent pregnancy resulted in hydatidiform mole, was followed by chorio-epithelioma, with early diagnosis and operation, and the patient is well five years later.

CASE 4.—Primipara, aged thirty-three, four and one-half months pregnant. There were no particular symptoms; a mass had been observed and watched for a few weeks when it was definitely diagnosed as an ovarian cyst, lying within the pelvis, to the left and back of the uterus.

Through a left rectus incision a pseudomucinous cystadenoma 10 by 8 cm., with a short pedicle made up of the mesovarium, was removed; the pregnancy was not disturbed; labor at term followed. A subsequent child was born a few years later.

CASE 5.—Primipara, aged twenty-four years, three months pregnant. There was slight discomfort on the left side of the pelvis where a rather fixed mass was

felt; the uterus had been in retroversion but had ridden out of the pelvis when seen by me and the mass was movable. An unruptured ectopic pregnancy was suggested but it was thought to be a small ovarian cyst. Operation revealed a simple serous cystadenoma the size of a lemon, with a long pedicle. The patient was delivered spontaneously at term.

CASE 6.—Mexican, aged thirty-six years, had been delivered one year and ten months before. Three months later a swelling appeared in the lower abdomen which gradually increased in size until its upper border was on a line with the umbilicus. Thirteen months after the last child, menstruation, which had been normal, stopped, and four and one-half months later she stated, that she felt life. When admitted to the Denver General Hospital the abdomen was tremendously enlarged, the patient complained of pain in the left side; there had been swelling of the right leg which disappeared at night; there was dyspnea, the patient was poorly nourished, weak, and stated that from the first month the abdomen had grown very rapidly.

The obstetrical service reported that fetal movements and heart sounds could be observed. The mass filled the whole abdomen, was dull everywhere excepting in



Fig. 3.—Case 6.—Tumor before operation, 27 days postpartum.

the left flank; ballottement was evident on pelvic examination and a diagnosis of hydramnios was made. Two months later the patient delivered herself of a normal child weighing six pounds and three ounces. The abdomen did not appreciably decrease in size but instead seemed to get larger so that respiration was embarrassed.

A diagnosis of ovarian cyst had not been made. Ascites and tuberculous peritonitis were suspected. Twenty-two days after delivery the patient was tapped and 1400 c.c. of clear, greenish, ascitic fluid withdrawn. There was some reduction in the size of the abdomen but on the following day it was as tense as before.

The patient was transferred to my service. The abdomen was completely filled with a smooth, cystic feeling mass; there was tympany for a handbreadth below the ensiform (stomach and colon) and some in the extreme left flank (descending colon); there was no fluid wave. Pelvic examination showed the cervix high in the pelvis, the uterus could not be felt, there was no tense bulging of Douglas' pouch and a trocar inserted in the midline, a short distance above the symphysis (point of previous puncture) showed a brownish pseudomucinous material.

The patient was operated upon on the twenty-seventh day postpartum. The ab-

domen was found completely filled by a large pseudomucinous cystadenoma arising from the right side, with a thick pedicle of mesovarium about four inches wide. The cyst was adherent to the anterior wall in the left iliac fossa and to the under surface of the right lobe of the liver. A large portion of the cyst, seven to eight inches in diameter, was necrotic in this region; behind, there were loose adhesions between the cyst and the mesentery. There was no pseudomucinous material in the abdominal cavity, though from two to three quarts of ascitic fluid were present.

The patient had a smooth convalescence and left the hospital about eighteen days after operation.

Very probably rupture of the upper portion of the cyst occurred during or shortly after labor, and necrosis of a large portion followed. The rupture of a pseudomucinous cystadenoma may carry a poor prognosis through return of the growth in the abdominal cavity. The time in this instance is too short to state results.

In this series of cases the results were all good, the reason being that they were detected in four instances early and removed at a favorable time. Small cysts may give rise to just as serious complications as large ones. The two not diagnosed gave rise to complications, in one a twisted pedicle, which, however, released itself; the last case developed a rupture with a necrosis of the cyst and grew rapidly in size; this patient was in bad condition at the time of operation; however, immediate recovery was uneventful.

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METROPOLITAN BUILDING.

THE USE OF INSULIN IN ECLAMPSIA*

(A PRELIMINARY REPORT)

BY H. J. STANDER, M.D., AND E. E. DUNCAN, M.D., BALTIMORE, MD.

(From the Department of Obstetrics, The Johns Hopkins Hospital and University)

THERE are evidently two fairly definite grades of eclampsia. In the mild form, the patient usually regains consciousness soon after each convulsion, while in the severe type, the convulsions are generally followed by a state of semiconsciousness or coma. This more severe grade of eclampsia has necessitated additional treatment to that now employed in this clinic, which is the modification of Stroganoff's method, as already outlined by one of us (Stander).

The blood-sugar level and the CO₂ combining power give us a fairly reliable index of the severity of the disease. In the milder forms of eclampsia the CO₂ combining power of the blood is not greatly decreased, while in the severe cases, especially where the patient remains comatose following a convulsion, we notice a most unusual drop in the CO₂ combining power. We feel convinced that in many, if not all of the very acute cases, where death ensues so remarkably swiftly, acidosis, as evidenced by the low CO₂ combining power, is the factor which requires our first consideration. There are, of course, severe cases of eclampsia in which pulmonary edema seems to be the last development in the picture, yet in such cases the disease always runs a comparatively longer course.

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The figures in Table I indicate that there exists a parallelism between the decrease in the CO_2 combining power and the increase in blood sugar. As recently shown in a publication from this clinic, eclampsia is associated with a definite hyperglycemia. Further investigation is necessary before we are in a position to say whether or not the hyperglycemia may be correlated with the low CO_2 values. Acetone and diacetic acid determination may throw light on the question.

At present our treatment of eclampsia is as follows: As soon as the patient is admitted, the modified Stroganoff treatment is started; a specimen of blood is obtained and a chemical analysis done immediately. The sugar and CO_2 values are carefully noted, and should

TABLE I

CASE NO.	CO_2	SUGAR
1	12.4	
2	15.5	
3	16.8	300
4	49.8	133
5	25.2	165
6	46.2	122
7	38.7	130
8	43.1	125
9	29.8	190
10	43.3	172
11	40.4	250
12	27.1	105*
13	28.1	182
14	35.9	143

*The blood sugar determination in this case was made on a specimen which had stood in the ice box twenty-four hours.

these show an undue rise in the blood sugar and a decrease in the CO_2 combining power, from fifteen to twenty-five units of insulin are administered. With the insulin we usually give a protective dose of glucose, which is about 2 grams of glucose per unit of insulin. With a marked hyperglycemia, it is perhaps not necessary to give glucose with the insulin, but in such cases it is advisable to have orange juice available should the patient develop a hypoglycemia.

Our results with insulin are given in Table II. The values before insulin administration are those obtained from blood specimens taken immediately before giving the insulin, while the figures in the "After Insulin Administration" columns are from the analyses made on specimens obtained about one to two hours after the insulin was given. The results show that a drop in the blood-sugar level and a rise in the CO_2 combining power, as well as a change from coma to consciousness, usually follow the administration of insulin.

Our indications for the use of insulin in eclampsia are, therefore, coma or semiconsciousness following a convulsion together with a CO_2

TABLE II

CASE NO.	DATE	TREATMENT	BEFORE INSULIN ADMINISTRATION			AFTER INSULIN ADMINISTRATION			MOTHER	CHILD
			SUGAR	CO ₂	CONDITION	SUGAR	CO ₂	CONDITION		
1	10/ 2/24	Insulin 15 units Glucose 500 c.c. 10%		12.4	Comatose	167	43.7	Conscious	Recovered	Premature Died 1st day Alive
2	10/12/24	Insulin 15 units Glucose 300 c.c. 10%								
3	10/15/24	Insulin 15 units Glucose 300 c.c. 10%		15.5	Unconscious		31.5	Conscious	Recovered	Alive
5	10/23/24	Insulin 15 units Glucose 300 c.c. 10%	300	16.8	Unconscious	183	39.7	Conscious	Recovered	Alive
12	5/21/25	Insulin 15 units Glucose 300 c.c. 10%	165	25.2	Semiconscious	133	33.8	Conscious	Recovered	Alive
13	5/28/25 11 A. M. 3 P. M.	Glucose 250 c.c. 10% Insulin 15 units Glucose 250 c.c. 10% Insulin 15 units	105* 182 128	27.1 28.1 29	Unconscious Unconscious Semiconscious	128 86	29 39.3	Conscious Semiconscious Conscious	Recovered Recovered Recovered	Alive Premature Premature

*The blood sugar determination in this case was made on a specimen which had stood in the ice box twenty-four hours.

combining power of 30 or below and an elevated blood sugar. The dosage of insulin is gauged by the degree of hyperglycemia and the weight of the patient.

The general practitioner as well as many obstetricians often have not the facilities to determine the blood sugar and CO_2 combining power. They can judge the degree of acidosis only by the condition of the patient. We feel that where the physician is unable to have an immediate analysis of the patient's blood, a persisting coma or semi-conscious state following a convulsion in what we have just described as the acute type of eclampsia, warrants the use of insulin. In such cases we would advise the use of a protective dose of glucose or of orange juice, because it would be very difficult to sense the development of a hypoglycemia without laboratory facilities.

We appreciate the fact that our number of cases treated with insulin is far too small to permit of any general deductions, yet we have had such excellent results in the few cases which we thought warranted the use of insulin that it might be advisable to publish them.

ECLAMPSIA, WITH UNUSUAL NONPROTEIN NITROGEN IN THE BLOOD: REPORT OF A CASE*

By ROBERT D. MUSSEY, M.D., ROCHESTER, MINNESOTA

(From the Section on Obstetrics, Mayo Clinic)

A WOMAN, aged twenty-seven, para 1, in the thirty-ninth week of gestation, entered the hospital January 21, 1924. She had no antenatal supervision until January 12 at which time her physician found albumin in the urine. His caution regarding work, diet, and elimination was poorly followed. On January 21, he was called to see her on account of dizziness which had persisted for twenty-four hours, with headache, spots before the eyes, twitching of the neck, and diarrhea. After his visit she had a convulsion and another on the train en route to the hospital.

Examination.—The patient was comatose. She appeared well nourished but pale. Her normal weight was 120 pounds; she had weighed 153 pounds the week before. Edema, as evidenced by "pitting," was practically *nil*. Her pupils were contracted and equal. Examination of the ocular fundi revealed no changes in the blood vessels. Morphine, $\frac{1}{4}$ grain, had been given by her physician two hours before. The systolic blood pressure was 150, the diastolic 90, the temperature 102° and the pulse rate 128. Albumin 3, granular casts (occasional), hyaline casts 2, and leucocytes 1, were found in the catheterized urine. The uterus was tonic and the fetal presentation could not be determined by abdominal palpation. The fetal heart was not heard. Examination by rectum revealed the fetal head well down in the pelvis; the cervix was effaced, and dilated 1 cm. Shortly after admission, the patient had a third convulsion. This was followed by others, twenty-one in all, the last one at 11 A. M. the next day. She regained consciousness one hour after the last convulsion.

*Submitted for publication May 26, 1925.

LABORATORY FINDINGS IN AN UNUSUAL CASE OF ECLAMPSIA

Date, 1925	Total fluid intake, c.c.	URINE			BLOOD CHEMISTRY						Hepatic function retention of dye	Hemoglobin, per cent	Erythrocytes, millions	Leucocytes	BLOOD PRESSURE		Weight, pounds
		Amount, c.c.	Specific gravity	Albumin	Urea, mg., for each 100 c.c.	Creatinine, mg. for each 100 c.c.	Uric acid, mg. for each 100 c.c.	Chlorids	Carbon dioxide combining power volumes, per cent	Phenolsulphone- phthalein, per cent return					Systolic	Diastolic	
1-21	650	45		3											150	90	157
1-22	1075	50													140	80	
1-23	720	3	1.012	2	164		18.3				2				116	80	
1-24	1020	0	1.007	2	221	14.5	14.5										
1-25	2160	1	1.009	1	221	14.5	14.5	585	42.0			56	2.54	18,600	120	76	
1-26	2000	0															
1-27	4200	2		1						O*							
1-28	2800	3	1.010	1	185	11.4			34.0	O*					142	90	
1-29	3000	3			221	11.0	11.3				1				136	80	
1-30	3000	6			194	9.0	9.0	571	49.0			55	2.73	16,600			
1-31	2600	2															
2-1	2800	1															
2-2	4200	1	1.005	1													
2-3	3600	3			139	9.0	3.9		59.0			58	3.97	17,000	120	84	
2-4	4100	2															
2-5	3500	2															
2-6	3500	3															
2-7	3400	2			43	3.5	3.1	617	60.0	30					122	80	
2-8	4400	2															
2-9	4000	1															
2-10	4000	2			36	2.1	3.3										
2-11	4800	1	1.002	1						25		59	2.96	9,200			
2-12	4500	1							62.4						128	75	120
2-13	4400	1															
3-26			1.007	2	18		3.98			65		68	4.06	9,900	114	78	122.5

*No return.

She was treated by the modified Stroganoff method, receiving in the first eighteen hours 1.5 grains of morphine hypodermatically in $\frac{1}{6}$ grain doses, and 60 grains of chloral by rectum. She was given 500 c.c. of 10 per cent glucose solution intravenously following the withdrawal of only 150 c.c. of blood, as shortly prior to this, the systolic blood pressure had fallen to 120 and the diastolic to 80. During the first lucid interval, eighteen hours after admission, she was given 2 ounces of castor oil by mouth. The day after her admission, she delivered a stillborn male fetus, weighing 7 pounds and 14 ounces. Low forceps were used to shorten the second stage.

The patient convalesced uneventfully. The only disturbing symptoms were occasional severe headaches and some excitability. Treatment during the puerperium consisted of forcing fluids, and daily sweating to combat the scanty urine with low specific gravity. All of the fluid was taken by mouth except 500 c.c. of 10 per cent glucose solution intravenously and 1000 c.c. of physiologic sodium chloride solution subcutaneously on the sixth day. The tabulation shows the relation between fluid intake and elimination and the retention of nonprotein nitrogen in the blood.

The notable feature of this case was the unusual retention of nonprotein nitrogen in the blood. The third day in the hospital, the urea was 168 mg., and the uric acid 18.3 mg. for each 100 c.c. of blood, and on the fifth day the urea was 221 mg., creatinine 14.5 mg. and uric acid 14.5 mg. There was complete phenolsulphonephthalein retention, and very low specific gravity of the urine. The clinical recovery was steady and apparently complete. The nonprotein nitrogen retention gradually lessened to 194 mg. urea on the tenth day, and to 139 mg. on the fourteenth day. On the seventeenth day 43 mg. urea, 3.5 mg. creatinine, and 3.1 mg. uric acid were found for each 100 c.c. of blood. The phenolsulphonephthalein functional test on the eighteenth day was 30 per cent.

Examination of the patient two months after her admission revealed normal renal function as evidenced by excretion of phenolsulphonephthalein, and normal nonprotein nitrogen in the blood. This fact in connection with a normal blood pressure and lack of evidence of chronic nephritis as determined by a study of the retinal arteries would seem to indicate complete renal recovery. In spite of this, however, with albumin 2 in the urine, and a specific gravity of 1.007, a diagnosis of chronic nephritis should be seriously considered. Except for occasional attacks of tonsillitis the patient had not been ill previously. The tonsils were septic and she has been advised to have them removed.

A NEW INSTRUMENT FOR THE TREATMENT OF ENDOCERVICITIS*

BY S. DI PALMA, M.D., F.A.C.S., NEW YORK CITY

ENDOCERVICITIS has been discussed so often and by so many that for fear of repetition I approach it only with the purpose of presenting a new instrument used in its treatment.

It is well known that endocervicitis is difficult to cure on account of the anatomic formation of the cervix. As a result of an inflammatory process, the cervical canal is clogged with purulent, mucopurulent or mucoid secretions, and drainage, at its best, is very poor. And no doubt this poor drainage is the cause of the changes described in its pathogenesis, besides leading to the chronicity of the condition. I believe that if good drainage is established soon after the acute stage, and medication properly applied, a cure should be obtained.

Of course when the disease has been going on for a long time, no method of treatment can restore the tissue changes to normal. If we get a disappearance, or practically a disappearance, of the discharge and stop the septic process, we should be satisfied, and usually are.

The three methods of treatment in general use at present, with more or less success, are:—1. Medication; 2. Cauterization; 3. Operation.

Medication gives us poor results except in very mild cases.

Cauterization, either with caustics, actual cautery, radium, etc., is uncertain and at times attended with a certain degree of danger. At present, the actual cautery seems to be favored by many, but personally, I have had better results with the instrument which I shall describe.

Operations are undoubtedly successful, but also have their drawbacks. Amputation is mutilating and certainly would not be used during the childbearing period. The only operation which works effectively and thoroughly, when properly performed, is the one devised by Arnold Sturmdorf, or one of its modifications. The trouble is that in many cases this excellent operation cannot be performed satisfactorily, as in small virginal cervixes, with high fixation of the uterus. The same is true of patients whose uteri are fixed by pelvic exudates, pyosalpingitis, etc. In these cases the cervix cannot be brought down sufficiently, and therefore, a thorough removal of the cone is impossible.

The instrument I have devised drains the cervical canal, irrigates it, and produces hyperemia. Suction tubes have been used before in gynecologic treatment, the originator, as far as I have been able to

*Presented before the section of Obstetrics and Gynecology, New York Academy of Medicine, February 24, 1925.

ascertain, being John Van Doren Young. I believe they are excellent for producing hyperemia, but they do not accomplish the cleansing of the cervical canal. And yet we know that the cervical canal is the seat of lesion in endocervicitis. The same objection applies to the modification of Dr. Young's tubes in which a funnel is connected with a stopcock opening into the tube, with the assumption that the negative

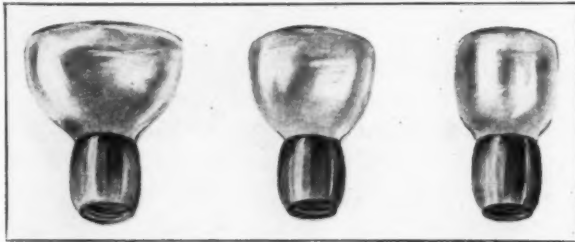


Fig. 1.

pressure will drive any medication placed in this funnel into the cervical canal.

The apparatus I am about to describe, by its construction and actual trial, does produce suction in the cervical canal and cleans it out. Any kind of medication may be applied up to about the internal os. Even caustic solution may be used if the instrument is made of silver. As

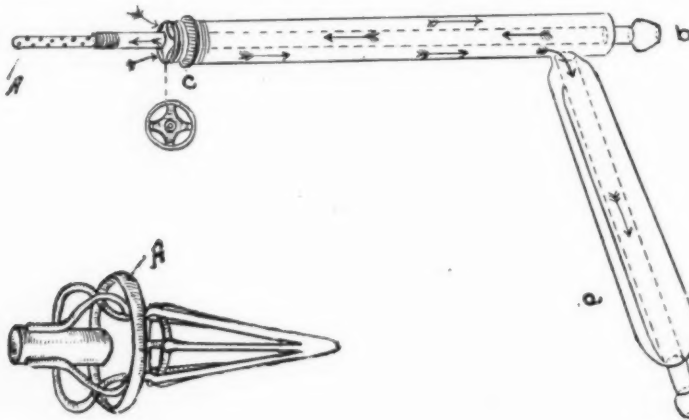


Fig. 2.

Fig. 3.

one will notice from the illustrations, it is constructed on the principle of the return flow irrigator.

There are three movable parts in the instrument. The cups (Fig. 1); the tip, (Fig. 2); the inlet and outlet tube (Fig. 3). The tip is made slightly shorter than the average length of the cervical canal and a cervical bar, *A* (Fig. 2) prevents entrance of the tip into the uterine cavity. There are present many small perforations which allow spurting of any fluid used, the action being a circular spray (Fig. 4). The outflow tube starts from the end of the inflow tube to the bottom of the

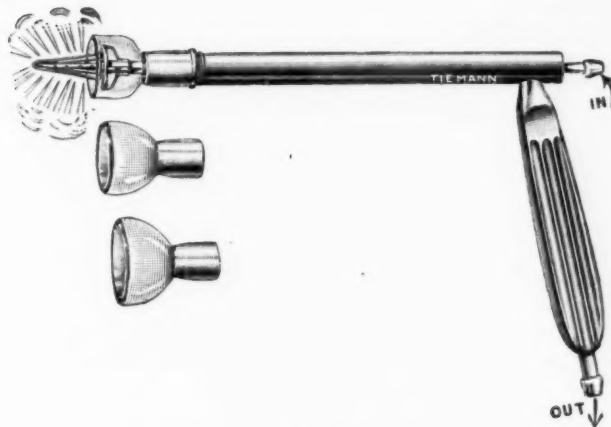


Fig. 4.

handle of the instrument (Fig. 3). The tip proper (Fig. 2), is made of fine rigid wire so as to keep open the cervical canal and the cervical mucosa is actually squeezed between the spaces when the negative pressure is applied, thus emptying the cervical glands of their contents. The instrument is used as follows:

The outflow tube (Fig. 5), is connected by rubber tubing to a suction jar of a Yankauer pump having a suction gauge. Another piece of rubber tubing is connected to the inflow end, (b) and inserted in any desired cleansing solution. The patient is placed in the dorsal or lithotomy position. A bivalve speculum is inserted. If the cervical opening happens to be narrowed, it may be dilated a little with a uterine sound. (This is seldom necessary.) The instrument is placed into the

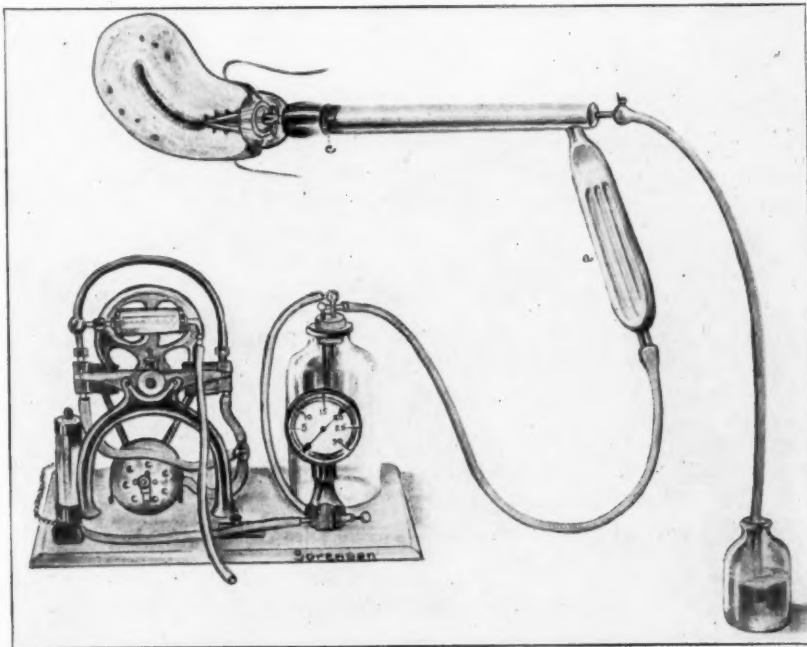


Fig. 5.

vagina and the tip in the cervical canal so that the glass cup fits snugly over the cervix. The motor of the pump is started. By holding the instrument tightly against the cervix, suction starts immediately. A partial vacuum existing in the cervical canal, the irrigating solution is drawn up in the inflow tube, makes its exit as a spray in the tip of the instrument, and washes out the cervical cavity. Any amount of irrigating fluid may be used, usually one pint to one quart is sufficient. Then the inflow tube is changed to a medicated solution, merurochrome, Dakin's, etc., which is sprayed into the cervical cavity.

If simple suction and hyperemia is wanted the inflow tube is closed by pinching it and the amount of suction regulated by the gauge. There are three sized cups to fit different sized cervices. The tip and cups, being removable, may be easily cleansed either by boiling or by the pump, using any antiseptic solution. It is important that the instrument be dried, as the small perforations at the end of the inflow tube may become occluded. There is a small movable band (Fig. 3. c) which regulates the distance of the edge of the cup to the bar of the tip, the distance being increased in hard cervices and decreased in soft cervices. Occasionally slight bleeding occurs after the use of this apparatus, if too much vacuum is used, but unless too much suction is applied it may be disregarded. The suction which I have found to be safe and most advantageous varies from ten to twenty inches of vacuum as shown on gauge.

This instrument should not be used in acute cases, as a matter of fact, no instrument should be used. Only subacute and chronic cases should be treated with this appliance.

I have employed the cervical endocleaner biweekly. A 1:1000 lysol solution was used when the discharge was of a mucopurulent type, but not very tenacious. In the latter type of cases a 0.25 to 0.5 per cent solution of sodium hydroxide was employed. A 2 per cent merurochrome solution used as medication has given me good results. All cases of endocervicitis treated as above described have responded favorably with ten to fifteen treatments, there being actual checking of the leucorrhea and marked improvement of the appearance of the cervix. It is my opinion that this instrument is the simplest, safest appliance which will wash out the cervical canal, medicate it, and establish drainage.

1103 PARK AVENUE.

REPORT OF 106 CASES OF EXTRAUTERINE PREGNANCY

By HERBERT E. STEIN, M.D., NEW YORK, N. Y.

(From the Gynecological Service of the Harlem Hospital)

OF all gynecologic lesions, none is more often erroneously diagnosed than ectopic gestation. Not only is it frequently mistaken for other pathologic states, but other conditions are sometimes suspected as being tubal pregnancies. Two reasons account for this: First, the etiology is still very dubious; second, its manifestations, subjective and objective, are so frequently atypical.

The diagnosis of the stereotyped case is quite simple, but unfortunately the variations are so numerous that in about 25 per cent of the cases our conclusions are faulty. The average history is as follows: a woman who has never been pregnant or has had a long period of so-called one-child sterility, misses a period. Two weeks thereafter she notices a slight spotting and is seized with such severe pains in the lower abdomen as to cause syncope. This complaint of fainting with pain is perhaps the most significant of all the symptoms and should always be inquired into and not be left to the patient to relate. It is caused by a hemorrhage into the wall of the tube, an actual rupture of the latter or by a tubal abortion through the fimbriated end. These painful seizures are of short duration, intense in character and are repeated at intervals of hours or days. The longer the condition supervenes the weaker the patient becomes. Abdominal examination before rupture occurs may be negative or elicit a slight tenderness in the lower lateral quadrant. If hemorrhage has taken place but been walled off by adhesions, a mass may be detected. I have seen one extend up as high as the umbilicus. In cases of free peritoneal bleeding, there is moderate general abdominal tenderness, more marked at site of rupture, moderate rigidity, and a slight rebound sign.

Vaginal examination in the majority of cases shows no change in the cervix or fundus. But in quite a few, there is a slight softening of the former and an enlargement of the latter. A mass can usually be palpated in the lateral fornix. It is tender and globular rather than sausage-shaped as so often described. The size of the mass varies with the duration of conception and the presence of surrounding adhesions. If there is free blood in the culdesac, we obtain a very characteristic boggy crepitating sensation.

As hemorrhage increases all the symptoms thereof become more evident, such as rapid, thready pulse, air-hunger, pallor, etc. A slight rise of temperature is not unusual. The blood count after rupture shows

a moderate leucocytosis and increased polynuclears and a hemoglobin reduction.

We have thus attempted to portray an average case, but symptoms even more than the physical signs are often misleading. For instance, the menstrual period may not have been skipped. Some patients give an irregular menstrual history extending over a long period antedating the ectopic pregnancy. Other patients run a high temperature due either to a concomitant infection of the tube or absorption of blood clots. To cite a few cases:

CASE 407.—Harlem Hospital: Age twenty-three, married, no children, four miscarriages, menstruation every twenty-eight days, last period being on time. During the past year she has suffered with pains in the lower abdomen, particularly after menstruation, vaginal discharge and painful urination. Abdominal tender mass, rigidity and a rebound present. Uterus slightly enlarged and an induration felt in the right fornix. Leucocytosis 12,500, polynuclears 79 per cent lymphocytes 21 per cent. Temperature 101°, pulse 90. Diagnosis: pyosalpinx. Operation revealed ectopic pregnancy.

CASE 567.—Age twenty-five, para iii, the last child two years ago, one miscarriage six years ago. Menstruation very irregular during the past nine months. Pains in the lower abdomen during the past four months associated with profuse vaginal mucopurulent discharge. During the past three days she has had a vulvovaginal abscess which evacuated on the day of admission to the hospital. On the following day the temperature rose to 102° F. and pulse 100 and continued thus for five days. The fundus was anterior and slightly enlarged, the culdesac and right fornix were occupied by an indefinite mass. Examination three days later showed a large fluctuating mass filling the whole culdesac. Diagnosis: Pelvic abscess. Preliminary aspiration of posterior fornix obtaining three ounces of dark fluid blood; diagnosis was changed to ruptured ectopic pregnancy and verified by laparotomy.

Statistics.—Out of 106 cases in the service of Drs. Cherry and Stein, at Harlem Hospital, 81 were correctly and 25 incorrectly diagnosed. This includes the ruptured and the unruptured, the large majority of the latter constituting the erroneous class. Out of the last 1,000 gynecologic admissions, there were 53 ectopic pregnancies, of which 45 were correctly diagnosed, showing a marked improvement in our statistics.

The pathologic conditions for which ectopic gestation was mistaken were as follows: pyosalpinx 9, cystic ovary 4, fibroid 3, no diagnosis 2, parametritis, adnexal tumor, pelvic abscess, general peritonitis, retroversion with pregnancy, hydrosalpinx and abortion each 1.

As will be noticed, the greatest difficulty lay in the differentiation between pyosalpinx and ectopic pregnancy. This is not so surprising when we realize that both conditions have signs and symptoms in common. For instance, menstruation may be absent in the inflammatory lesion, owing to the hormone destruction in the ovary; pain is

present in both, temperature may be equally high in the ectopic pregnancy; vaginal smear may reveal the gonococcus in either type. The mass in the fornix, the moderate leucocytosis and increased polynuclears all tend to produce a confusing picture.

Ruptured ectopic pregnancy, following induced abortion, can easily be mistaken for an infection and should always be borne in mind. The following case is of interest:

Mrs. F., age twenty-six, was overdue ten days. Abortion was induced by catheter followed in a few days by curettage. She had no complications until two weeks thereafter, when she was seized with severe abdominal pains, which at first were intermittent but later became continuous. The family physician was called in and without making a vaginal examination, naturally suspected an infection secondary to the induced abortion. After a week, I was consulted. The patient looked very pale and weak, temperature 100° F., pulse 120. The culdesac was ballooned out by a fluctuating mass. A tentative diagnosis of a ruptured ectopic pregnancy was made. An aspirating needle inserted into the culdesac obtained dark fluid blood, thus confirming the diagnosis.

Rupture of a cyst of the ovary or hemorrhage into a cyst or into the tube lumen may present every sign and symptom of an extrauterine pregnancy. I know of no means of differentiating them. However, as they all call for operative intervention if the bleeding is copious enough, the mistaken diagnosis is of little importance.

How, then, can we lessen our diagnostic errors? There is no gynecologic condition in which a good history is so essential. In fact it is the most important premise upon which to base a logical conclusion. The trite expression, "Once a cesarean always a cesarean," is quite applicable to extrauterine pregnancy.

Every woman with a history of having skipped a period should be viewed as a possible extrauterine pregnancy until proved otherwise. Irregular bleeding should put one doubly on guard. However, the most important symptom of extrauterine pregnancy is that of syncope, usually associated with pain but sometimes occurring without any discomfort or apparent cause. Patients very rarely volunteer the information of having fainted and, therefore, it must be elicited by questioning. When these seizures are repeated and associated with severe cramp-like pains of short duration, the diagnosis is almost positive even though apparently contradicted by subsequent physical examination.

Strange as it may seem, even the cases of rupture of the tube with hemorrhage are not always correctly diagnosed; first, if encapsulation of hemorrhage between the layers of the broad ligament takes place, second, if the bleeding is of the type of a slow ooze. Personally, I have never encountered the bluish discoloration of the umbilicus. A means of great value is aspiration of free dark blood from the culdesac.

The only laboratory assistance is a low red blood count together with a low and progressively dropping hemoglobin.

In conclusion, I wish to emphasize the importance of a careful survey of each case, paying particular attention to details and giving proper evaluation to each symptom and sign.

41 WEST SEVENTY-FIFTH STREET.

SPONTANEOUS RUPTURE OF THE UMBILICAL CORD

By R. S. SIDDALL, M.D., DETROIT, MICHIGAN

(From the Obstetrical Department, Henry Ford Hospital)

RUPTURE of the umbilical cord during spontaneous labor is so infrequent that a new case is of interest. Moreover, certain details of the case here reported emphasize the cause of at least some of these accidents, the etiology and predisposing factors of which have been the subject of considerable conjecture and discussion. The importance of the condition to forensic medicine is evident, especially cases such as Pawlicki's where the tear was so smooth as not to be differentiated from a cut, and when there are multiple injuries as described by Walz.

CASE REPORT

Mrs. F. N., white, aged thirty. The first pregnancy was normal. Delivery at term was accomplished by manual completion of dilatation of the cervix and mid-forceps extraction following prolonged labor of fifty-three and a half hours, characterized by weak and infrequent pains. The child died soon after birth, presented a spina bifida and moderate hydrocephalus, no evidence of syphilis; findings confirmed at necropsy. The mother had an uneventful puerperium.

The second delivery was at term one year later, again following a normal pregnancy, general physical examination and past history essentially negative, pelvis normal, blood pressure never above 125 systolic and 80 diastolic, no albuminuria, blood Wassermann reaction negative with Kolmer antigen. The first stage of labor was completed in five hours, and following artificial rupture of the membranes, the head, originally in L.O.P. position, rotated quickly to occipitoanterior and descended to the perineum until the scalp was just visible at the vulva. From this point there was no advance for forty minutes in spite of good expulsive pains aided by considerable pressure on the fundus according to Kristeller's maneuver. Then, advance began again, and after a few pains the head could be expressed by pressure behind the anus. At birth, the cord was not around the neck, and no trouble was experienced in extracting the shoulders and body. The umbilical cord was completely ruptured and, during the few seconds required to clamp the part attached to child, 50 c.c. or more of blood escaped. The child was pale but soon cried lustily. The weight was 4060 grams, length 53 cm., distance from umbilicus to jugular notch of the sternum 17 cm. with the body lying flat and 11 cm. when in flexion. The third stage required seven minutes and was uneventful. Perineum was not torn. The puerperium was normal, and mother and child were in excellent condition when discharged from the hospital on the sixteenth day.

The umbilical cord was about 1 cm. in diameter, with no true or false knots, and about the usual degree of twisting. Total length of the cord was 38 cm., 12 cm. attached to the umbilicus and 26 cm. to the placenta. About 5 cm. of the latter portion was hanging from the vagina following birth of the child and before the placenta had separated. The tear was at slightly less than 90°, was somewhat uneven but not jagged, and appeared as if the cord might have been severed by a dull cutting instrument. The placenta weighed 600 grams and measured 19.5 by 17.5 by 2.5 cm. Insertion of the cord was eccentric, and there was nothing abnormal seen on gross examination.

Microscopic examination of the umbilical cord showed no abnormality,—Wharton's jelly normal, vessels tightly contracted, muscle well developed, no inflammatory exudate, abundant elastic tissue in portions adjacent to the rupture (Weigert's stain). Sections from the placenta showed normal villi and nothing noteworthy except several small chorionic cysts.

Injuries of the umbilical cord as described in the literature may involve one or more vessels or may consist of complete rupture. Tearing of vessels velamentously inserted and lying in the membranes in front of the presenting part will not be considered. Partial rupture seems to be of rare occurrence. It may involve the vein or one or both arteries and result in either hematoma of the cord or profuse external bleeding when Wharton's jelly and the amnion of the cord are also torn through. Complete rupture occurs commonly from the fall of the child in precipitate deliveries, from the upright or squatting posture, and is not uncommon from forceful release over the head of loops about the neck or from operative delivery when the cord is actually or relatively short. However, in uncomplicated labor in the horizontal posture the accident is exceedingly rare. Forssell, in 1908, found only 26 reports of both kinds of rupture during spontaneous labor (28 with the 2 reported by him from 14,639 deliveries), and since that time others have been reported by Glaessgen, Fabignon, Unterberger, Ritter, Nebesky, Cooper, Kautsky, Kermauner, Nassauer, Lönne, and Walz,—those of Glaessgen, Fabignon, Unterberger, and five of Nebesky's being of the complete variety.

In a search for the cause, certain authors have pointed out in their cases anomalies or disease of the vessels which they considered to be at least predisposing factors, since the strength of the umbilical cord is largely, if not principally, dependent upon its vessels, though some importance in this respect has been attributed to the whartonian jelly (Forssell, Nebesky). Weakness of the vessel walls has been ascribed to imperfectly developed elastic tissue, to destruction of muscle fibers associated with the inflammatory exudate of syphilis, to the existence of thin walled varices, and to a crushing or grinding injury of cord lying between the child and the pelvic wall. It is supposed, then, that with labor pains the blood is squeezed out of the placenta into the fetal circulation, thus raising the blood pressure to the bursting point of the weakened vessel wall. Such a possibility

seems established by at least one case, namely Edelberg's, in which rupture occurred in the intraabdominal portion of the widely dilated vein, a place where it is unlikely that mechanical trauma could have come into play.

Obviously, the foregoing explanation could likely apply only to hematoma formation and bursting of single vessels. For complete separation of the cord, we must rather look to physical injury as the probable direct cause. Forssell, Unterberger, and especially Kermauner emphasize mechanical tension, with actual or relative shortening of the cord as necessary contributory factors, and it is noteworthy that with the single exception of Funke's case (cited by Forssell) complete rupture has always occurred during the expulsive stage of labor. Many authors further believe that the same cause is responsible for tearing in the majority of instances where single vessels are injured. It is conceivable that the presence of conditions mentioned in the previous paragraph might predispose to rupture, but that these are not essential is made plain by the fact that they were absent in a number of cases, including the one reported above.

The occurrence of rupture where the cord is actually too short for expulsion of the child is doubtless due to direct traction on the cord between the umbilicus and the placenta, which is seldom pulled away (Nebesky). Usually the tear is near the fetal end since this is most often the weak portion as evidenced by rupture in precipitate delivery from the upright posture and by experimental traction on a number of umbilical cords (Nebesky). Moreover, syphilitic degeneration usually affects the fetal portion first, and crushing between the fetal body and the pelvic wall would be likely to occur near the umbilicus.

Where there is relative shortening due to twisting around the neck, or other part of the fetus, it has also been noted that injury usually occurs in the fetal third of the cord. Lönne holds that tension between the fetus and the placenta becomes equalized throughout the length of the cord and that here, as well as in actual shortening, the same factors predisposing to rupture in the part near the child come into play. Kermauner, on the other hand, makes the more logical suggestion, it would seem, that the cord becomes fixed at the place of looping and that sufficient stress for rupture between this point and the umbilicus may be caused by extension during labor. It is believed that the mechanism in the instance reported above was of this nature—namely, that the umbilical cord, though actually long enough for normal spontaneous labor, became looped around the neck while the fetus was in the usual intrauterine habitus of flexion, and that, with descent during the second stage of labor, extension of the head and body to conform to the contour of the birth canal caused enough tension on the cord between the umbilicus and the neck for

rupture. It was estimated that the piece of umbilical cord attached to the placenta was of just sufficient length to encircle the neck under tension when the vertex was at the outlet. Rather sudden advance of the head again after considerable delay was interpreted to have been consequent upon release of resistance by rupture of the cord.

As would be suspected this accident seriously affects the prognosis for the child alone. Kermauner considered the danger from bleeding to be minimal and referred to the experiments of Rieländer who got only slight bleeding from the fetal ends of severed cords. Lönne repeated these observations with essentially the same results but pointed out that bleeding might be much greater in the presence of asphyxia or syphilitic damage to the vessels. On the other hand, in cases reported by him and others blood spurted from the ruptured cords until they were clamped, the child in Nassauer's report almost certainly died from loss of blood, and in our case bleeding was profuse until the cord could be clamped. In any event, there would be grave danger from asphyxia unless delivery should occur within a few minutes after rupture. Evidently, treatment should be prompt delivery when a diagnosis can be made before birth.

NOTE.—Since the above paper was accepted for publication, the following case has occurred:

H. J., white, American, aged thirty-one years, third pregnancy. Past history and physical examination were negative. The pelvis was normal, and the blood Wassermann negative with Kolmer antigen. Pregnancy was uneventful, and spontaneous labor of five and one-half hours occurred at term. With full dilatation of the cervix, the membranes were ruptured with a blunt hook, and the head, originally in L.O.A. position, was quickly born. There was no cord about the neck, and the body was easily extracted. The cord was bleeding profusely at a point six inches from the umbilicus, the blood coming in rapidly recurring spurts. The child was in excellent condition,—weight 3905 grams, length 53.5 cm. Puerperium was uneventful, and mother and child were discharged in excellent condition, the fourteenth day.

The umbilical cord was 37 cm. long and was inserted directly and eccentrically. It was 12 mm. in diameter and showed about the usual twisting. At its middle there was a triangular tear, forming a flap 15 mm. long and half as wide, the apex or free edge pointing toward the placenta. At its attachment, the flap was about 4 mm. thick. The tear laid bare a vessel in which could be seen a longitudinal slit approximately 2 mm. long.

Microscopic examination was made of eight sections from the tear and others from the placental and fetal ends. The torn vessel was an artery which otherwise appeared normal. The media and adventitia were of the usual thickness, and there were no signs of inflammatory exudate or degeneration. Nor, was there any evidence of crushing or grinding, the tear being clean cut except at one end where there was slight infiltration of blood and serum into the adventitia. Stains by Weigert's method showed no deficiency of elastic tissue fibers directly at the tear or elsewhere in the vessel. The other artery and the vein showed normal vessel walls, and likewise, Wharton's jelly appeared as usual. The amnion at the tear was thin, but this

is no unusual finding. Except for several small white and red infarets, the placenta was normal.

Partial rupture of the umbilical cord involving arteries only, seems to be exceedingly rare. Lönne reported an instance in 1924, but found only one other (Westphalen's) in the literature. The cause of the accident in our case is obscure. The shape of the injury and the fact that it was much smaller in the vessel than superficially, indicate that the tear began externally. However, there was no clinical evidence of traction on the cord; and, moreover, a tear of the vessel from such cause would probably be transverse rather than longitudinal.

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ROENTGENOGRAPHIC DIAGNOSIS OF ANENCEPHALY

BY LOUIS RUDOLPH, M.D., CHICAGO, ILL.

THE following case of an anencephalic monster, diagnosed during labor, is reported in order to emphasize the value of the timely use of the x-ray in obstetrics when some abnormality is suspected during pregnancy or labor.

Mrs. S., age twenty, primipara, presented herself for examination on September 13, 1924. She had been married for one year and three months, but had never been pregnant.

Family history: Mother has a marked lordosis, which followed a spinal injury in childhood. A sister fifteen years old was born with a marked degree of hydrocephalus and at the present time is subnormal, having mentality of a two year old child.

Menstruation at the age of twelve; of thirty day type; duration four to five days; regular; severe dysmenorrhea. Last menses July 3, 1924. Expected labor about April 10, 1925.

The patient was well nourished and muscular, about four months pregnant. Blood pressure: systolic 100, diastolic 70. Weight 139 pounds. Wassermann reaction negative. The thyroid was moderately enlarged.

The patient's progress was uneventful when seen every two weeks. Examination at about the thirty-sixth week of pregnancy (March 17, 1925): Physical condition good. Blood pressure: systolic 106, diastolic 70. Weight 162 pounds. Urine negative. Height of the uterus from the pubis to the fundus, 33 cm. Fetal heart sounds were heard in the median line, just below the umbilicus, good quality,

and the rate 140. Abdominal examination showed the ovoid to be longitudinal; small parts on the right. Rectal examination showed presenting part high and irregular. Diagnosis: Left sacro-anterior, although the head of the fetus could not be palpated in the fundus.

At about the expected time of labor, April 9, 1925, the weight was 173 pounds. Height of the uterus from the pubis to the fundus, 39.5 cm. Fetal heart sounds were heard in the lower right and left quadrants, of equal intensity, and the rate 140. Abdominal examination showed the ovoid to be longitudinal; small parts on



Fig. 1.

the right; and the fundus was boggy. Rectal examination: the presenting part was high and gave evidence of being round and hard. Diagnosis: Left occipito-posterior, indefinite, and hydramnios.

The patient was advised to have an induction of labor, but refused, because of the possibility of an error in her last menstruation. She was examined weekly and the weight gradually increased to 176 pounds on April 23; on April 29, it decreased to 170 pounds; on May 9, decreased to 167 pounds, and the height of the uterus from the pubis to the fundus was 38 cm; on May 12, the weight was 167 pounds. The fetal heart sounds were distinctly heard at all examinations, and by palpation

and to the patient the fetal movements were active. Never did the patient have uterine contractions which would simulate the onset of true or false labor.

On May 12, thirty-two days after the expected date of labor, the abdominal examination showed that the fetus and small parts were not distinctly palpable; the uterus was high, close to the ensiform, and tense. Height of the uterus from the pubis to the fundus, 38 cm. The fetal heart sounds were heard in the lower right quadrant of the abdomen, good quality, and the rate 140. The patient stated that the fetal movements were active. Rectal examination: the cervix was not effaced or dilated, and the presenting part was in the mid-pelvic plane, but I could not determine the presenting part. Diagnosis: Left cephalic or podalic presentation, hydramnios, and postmature fetus.

The patient was advised to have the pregnancy terminated at once. She accepted this advice and entered the hospital (Mount Sinai). At 4 P.M., under ether anesthesia, the membranes were separated from the lower uterine segment and the cervix packed with plain gauze. Patient returned to bed and at 5 P.M., castor oil and quinine were given. The presenting part was high, the bag of waters intact and tense, and through it I felt an irregular body which caused me to change my diagnosis to a breech. For twenty-four hours no uterine contractions set in, but on account of anuria, the packing was removed.

On May 13, at 4 P.M., a Vorhees bag was inserted, but at the end of twenty-four hours there were no uterine contractions. The bag was removed, because I began to suspect the possibility of a monster. On account of the indefinite previous diagnosis, I requested Dr. M. I. Kaplan, radiologist at the Mount Sinai Hospital, to x-ray the patient and anencephaly was the diagnosis. (Fig. 1.)

On May 15, at 4 P.M., the bag of waters was ruptured, a great quantity of bloody liquor amnii escaped, and the lower uterine segment was packed with plain gauze. The patient went into active labor at 5 P.M.

On May 16, at 1:15 A.M., rectal examination showed dilatation complete, presenting part high, and the pains strong. At 3:30 A.M., the patient began to show signs of exhaustion and the presenting part made very little progress.

The patient was anesthetized with ether. Forceps were applied to the head which was delivered to the vulva, but began to slip. A hook was applied to the posterior axilla, and the posterior shoulder was brought down to the perineum. The hook was next applied to the anterior axilla, and the monster easily delivered with the aid of a deep perineotomy. The patient was in good condition. It was a male, stillborn, weighed 9½ pounds, and was markedly macerated.

The puerperium was uneventful, the patient leaving the hospital on the tenth day.

An interesting feature of this case is the advanced maceration, although fetal heart sounds were last heard on May 14, at 8:30 P.M. and the patient stated that she felt fetal movements up to the evening of the fifteenth. The weight of the patient increased to 176 pounds on April 23, and decreased to 167 pounds on May 12. From the degree of maceration and the fact that the patient lost so much weight, it would seem that the fetus was dead many days before the delivery, yet the fetal heart sounds and fetal movements were present about thirty-six hours before the delivery of the monster.

This case and some others of macerated stillbirths in which the fetal heart sounds were heard from a few hours to twenty-four hours before the deliveries raise the question whether maceration can precede the death of the fetus.

STATISTICAL SURVEY OF OBSTETRICS IN PASADENA, AS
AN EXAMPLE OF OBSTETRICS AS PRACTICED IN
CITIES OF CALIFORNIA, JANUARY 1, 1924,
TO DECEMBER 31, 1924*

BY J. SEVERY HIBBEN, M.D., PASADENA, CAL.

VITAL statistics, according to Newsholme, is the science of numbers applied to the life history of communities and nations. Wilbur gives an amusing definition which I think is true in many respects. He calls it the "Cinderella of modern public hygiene, sitting in the chimney corner sifting the ashes of dusty figures while the proud sisters (bacteriology and preventive medicine) go to the ball and talk about the wonderful things they have done."

My interest in statistics comes from the recognition of their value from my experience as former health officer. Statistics may be likened to a budget system which gives us an inventory of our assets and expenditures and the end-results thereof.

Before considering Pasadena, I present a few statistics concerning California as a whole. There were 86,899 births in 1924 and 56,751 deaths, the excess of births over deaths being 30,148.

There were 5,832 deaths of infants under one year of age exclusive of stillbirths. The infant death rate per 1,000 births was 67.1.

The classification of births as to nationality and sex was as follows:

	Male	Female
White	41,193	39,025
Negro	490	445
Indian	107	81
Chinese	525	463
Japanese	2,245	2,236
Others	46	43

The number of maternal deaths was 453, the chief cause of death being albuminuria and convulsions.

Pasadena, with an estimated population of 70,000, had 1414 births, or a birth rate of 20 per 1,000 population.

There were 843 deaths, or a death rate per 1,000 population of 12, the increase of birth rate over death rate being 67 per cent.

There were 63 deaths of children under one year of age exclusive of stillbirths. The infant death rate of children under one year of age was forty-four.

*Read at a meeting of the Pasadena Branch of Los Angeles County Medical Society, June, 1925.

TABLE I

YEAR	1917	1918	1919	1920	1921	1922	1923	1924
Population	42,300	45,000	50,000	45,354	55,000	58,000 (estmd.)	65,000	70,000
No. deaths	513	597	570	564	692	757	787	843
Deaths per 1,000	12.1	13.3	11.4	12.4	12.6	13.1	11.6	12.0
No. births	610	639	672	825	924	974	1207	1414
Births per 1,000	14.4	14.2	13.4	18.2	16.8	16.8	17.8	20.2
Deaths under 1 yr.	17	28	29	22	27	45	44	63
Deaths under 1 yr., per 1,000 births	27.8	43.8	43.2	26.7	29.2	46.2	36.5	44.6

Table I gives the comparative figures for the past eight years, from 1917 to 1924 inclusive, or death rate per thousand population; birth rate per thousand population, and the infant death rate per 1,000 of children under one year of age.

There are 125 regular physicians, 34 osteopaths, 23 chiropractors, 3 drugless healers, and 17 Christian Science practitioners, or a grand total of 202 persons administering to the sick of Pasadena. This gives us 1 practitioner for each 347 people.

TABLE II
CLASSIFIED BIRTHS FOR 1924

	TOTAL	WHITE	NEGRO	MEXICAN	JAPANESE	CHINESE
Male	725	615	22	65	22	1
Female	689	602	11	65	11	0

In attendance on 1414 births in 1924, we have represented:

63 regular physicians delivered 1327 cases,—average 21 each.

4 osteopaths “ 9 “ “ 2 “

1 chiropractor “ 2 “ “ 2 “

2 midwives “ 31 “ “ 16 “

6 others “ 6 “ “ 1 “

Total 1375 18 “

39 M.D.'s, D.O.'s, and others, outside of Pasadena.

Total births, 1924 1414

So, of the 202 administering to the sick of Pasadena, there were 76 represented in obstetric practice, or 38 per cent.

Of a total of 1414 births, 862 were born in the Pasadena Hospital,

68 “ “ “ Keaster's Hospital,

129 “ “ “ Woman's Hospital,

355 “ “ “ Homes or elsewhere.

Deliveries in homes, 25 per cent.

Deliveries in hospitals, 75 per cent.

The percentage of Pasadena Hospital deliveries, 81.5

The percentage of Woman's Hospital deliveries, 12

The percentage of Keaster's Hospital deliveries, 6.5.

Therefore, 1059 cases, or 75 per cent of total births were delivered in hospitals, while 355, or 25 per cent were home deliveries.

Of the 125 regular physicians practicing in Pasadena, 49, or 31 per cent of this number, were doing some obstetrics.

Below are listed the 15 regular physicians delivering the greatest number of cases, giving percentage of total births each man delivered:

No. 1 had 333 cases, or 32.1% of total	No. 8 had 47 cases, or 4.5% of total
No. 2 had 144 cases, or 13.9% of total	No. 9 had 31 cases, or 3.1% of total
No. 3 had 115 cases, or 11.1% of total	No. 10 had 25 cases, or 2.4% of total
No. 4 had 72 cases, or 6.9% of total	No. 11 had 23 cases, or 2.2% of total
No. 5 had 58 cases, or 5.6% of total	No. 12 had 21 cases, or 2.1% of total
No. 6 had 57 cases, or 5.5% of total	No. 13 had 20 cases, or 1.9% of total
No. 7 had 54 cases, or 5.2% of total	No. 14 had 19 cases, or 1.8% of total
No. 15 had 18 cases, or 1.7% of total	

In other words, these 15 men delivered 1307 cases, or 74 per cent of total of 1414 births. The distribution among other regular physicians doing obstetrics in Pasadena was as follows:

3 men ranged between 10-15 cases.
4 men ranged between 15-20 cases.
13 men ranged between 5-10 cases.
14 men ranged between 1-2 cases.

Of the 49 men doing obstetrics in Pasadena, only 3 limited their practice to obstetrics exclusively, and they delivered 34.5 per cent of total of 1414 cases: No. 1—333, No. 2—144, and No. 3—11.

Stillbirths.—There were 43 stillbirths, or 30 per 1,000 cases; 30 stillbirths were born in hospitals, 13 in homes; 30 were of native born and 13 of foreign born parents; 1 case followed cesarean section, 8 cases followed forceps delivery, 3 cases followed version, and in 31 cases the cause was unknown or not classified.

Cesarean Sections.—There were 31 cesareans performed out of a total of 1414 deliveries, or 2.2 per cent. These were all done at the Pasadena Hospital, which had 862 births, or 3.6 per cent of total births in this institution.

There was only one death and this was on a neglected eclampsia; patient with a contracted pelvis who was cared for by an out-of-town physician and sent to the hospital in a dying condition. There was only one stillbirth due to cesarean section.

Eight men performed these operations, all were of the classical type. No. 1 had 12 cesarean cases, which represented 3.6 per cent of 333 cases delivered by him. No. 2 had 4 cases, or 2.8 per cent of 144 cases; No. 3 had 5 cases, or 7 per cent of 72 cases; No. 4 had 3 cases, or 10 per cent of 31 cases; No. 5 had 3 cases, or 13 per cent of 23 cases; No. 6 had 2 cases, or 10 per cent of 21 cases; No. 7 had 1 case, or 5.3 per cent of 19 cases, and No. 8 had 1 cesarean case and 1 delivery.

The indications for cesarean were given as follows: contracted pelvis, 8 cases; hydrocephalus, 1; dystocia, 3; toxemia of pregnancy, 6; tuberculosis, 1; dystocia,—twins, 3; exostosis anterior sacrum, 1; premature separation placenta, 1; former cesarean, 2; placenta previa, 3; severe tear of cervix and uterus, 1; and fibrous nonelastic uterus, 1,—a total of 31.

There were only 6 maternal deaths out of 1414 deliveries, or 3.6 per 1,000. There were no maternal deaths in patients delivered at home. The 6 deaths occurred in the Pasadena Hospital where 862 cases were delivered, giving a maternal mortality rate of 5.8 per 1,000 cases in this institution.

The causes of deaths were given as follows: 2 cases eclampsia, 1 pulmonary embolism, 2 lobar pneumonia, and 1 coma following pregnancy, normal delivery.

ANALYSIS

Of the 862 Pasadena Hospital deliveries, there were:

696 normal deliveries, or 80.7%
 135 forceps (101 low, 24 mid, 10 high.), or the 15.7%.
 31 cesareans, or 3.6%
 209 lacerations.
 150 episiotomies.
 5 maternal deaths.

SUMMARY AND CONCLUSIONS

1. The maternal, stillborn, and infant mortality rates in Pasadena compare favorably with other cities of the same population, and are evidence that adequate prenatal care is being given patients.

2. Seventy-five per cent of deliveries being in hospitals in Pasadena, shows that the public is being educated to advantages of hospitalization in maternity cases.

3. The small number of cases delivered by cesarean section is evidence that most Pasadena physicians are practicing conservative obstetrics.

4. Osteopaths, chiropractors, midwives, and Christian Scientists delivered only 48 cases out of a total of 1414 births.

	Pasadena	State
5. Maternal mortality per 1,000 confinements,	4.3	5.1
Stillborn per 1,000 confinements	29.1	28.9
Infant deaths per 1,000 live births,	46.7	67.1

6. There were no maternal deaths from septicemia.

7. Women of Pasadena and California, in addition to adequate medical care, cannot help having normal prenatal period, normal deliveries, normal puerperium, and healthy babies on account of the very invigorating climate where most babies are breast fed, thus reducing infant mortality.

44 SOUTH MARENGO AVENUE.

A FEW REMARKS ABOUT THE EFFICIENCY AND
INEFFICIENCY OF OUR THEORIES, WITH
SPECIAL REFERENCE TO GYNECOLOGY
AND OBSTETRICS

BY ALFRED PLAUT, M.D., NEW YORK CITY

(Pathologist at the Woman's Hospital in the State of New York)

THE trend of modern medicine is towards including a broad knowledge of general biology and pathology; therefore, the following contribution may not be out of place. Everywhere in science a struggle is going on against the too mechanistic theories which resulted from the tremendous technical progress of the nineteenth century and from the well justified opposition against the unscientific, vitalistic, and other doctrines of earlier times. The prevalence of chemical and physicochemical studies in the medical journals of the last decade might make one believe that the mechanistic era had disappeared. However, the insufficiency of mechanistic thinking is not only due to the fact that its theories try to explain everything with the laws of mechanics of solid and fluid bodies, but its shortcomings are also to be found in the idea that the best and shortest way of solving medicobiologic problems is to find for them a relatively simple explanation,—either a physical one based on gravitation, pressure, or hydrodynamic laws or a physicochemical one like hydrogen-ion concentration or surface tension. It shall be demonstrated in the following examples that this manner of investigation apparently has been greatly overdone and it shall be shown that in many instances seemingly well-founded scientific explanations have completely failed because they did not fully consider the extreme complexity of biologic processes but approached them one-sidedly.

One of the most striking instances, which is fresh in our memory, is the breakdown of the purely calorimetric doctrines in nutrition. Up to 1912, we were all pretty well satisfied with this theory; today our knowledge of the so-called vitamins has shown the insufficiency of the relatively simple calorimetric theory and we are bound to recur to the most complicated and still very obscure effects of enzymes and related biologic agents. The deficiency diseases prevalent in Asia and Europe have shown and still show clearly enough the great practical importance of this change in our theories.

Before we discuss our problem with special relation to gynecology and obstetrics, one other fact of general biology may be mentioned: Nobody doubts that Darwin's ingenious theories of selection gave the biologic sciences the greatest impulse towards progress, but today,

with improved knowledge of certain data in heredity and with a somewhat different frame of our biologic mind, most zoologists agree that we cannot explain the formation of new species by means of the theories of selection. Here, again, we feel that we must recur to immanent properties and characteristics of the germ plasma which are still far out of the reach of our chemical and physiologic methods of investigation.

The literature on pyelitis in the last few years shows an increasing tendency to abandon the merely mechanical theory of stasis due to pressure of the pregnant uterus and to look for other factors to explain its origin. It was well known that stasis in the urinary tract readily leads to infection and easily aggravates a preëxisting one. Thus, the *Bacterium coli* was supposed to migrate upstream in the ureter from the bladder when the pressure of the pregnant uterus caused stasis in the ureter; the greater frequency of right-sided pyelitis was easily explained by the frequency of dextroposition of the uterus. Pediatricists, however, pointed out that pyelitis is very common in children and that in children too the right kidney is more frequently affected than the left. Soon afterward doubts arose as to whether the ureter is often compressed or could be compressed by the pregnant uterus. Ureteroscopic findings were recorded which tended to indicate that the partial ureteral obstruction in pyelitis gravidarum is not due to external pressure but to intraureteral changes. Thus, the mechanical theory of pyelitis is losing ground, especially since it is unable to account for the frequent occurrence of right-sided pyelitis in children. A better explanation has been offered; there are intimate connections between the lymph vessels of the right kidney and the cecum, therefore the greater likelihood of infection of the pelvis of the right kidney, especially if we consider the prevalence of cecal stasis and of inflammatory processes in the appendix. This prevalence would explain the greater frequency of right-sided pyelitis even if similar lymph vessel connections should be found to exist between the left kidney and some portions of the intestine. In this manner the possibility is suggested that in some cases a pyelitis in pregnancy represents solely an exacerbation of a pyelitis of childhood which has not completely healed, for it is generally known how stubborn pyelitis may be in a child. Animal experiments confirm these theories, and patients have already profited by them. There are now cases on record where a pyelitis of a child which for years had been treated with all methods of urology without success, subsided rapidly after the child had been given a diet poor in proteins, and its bowel function had been regulated. These cases were cured because the causative factor was removed; namely, the migration of intestinal bacteria from the intestine to the pelvis of the kidney. In analogy with the intestinal origin, the idea has been brought forward recently that infections of

the ureter could be caused by endocervicitis, since lymphatic connections between cervix and the lower part of the ureter seem to exist.

Until recently there existed little doubt concerning the origin of the hematoma found in the corpus luteum. The idea prevailed generally that with the rupture of the ripe follicle inevitably blood vessels were severed and that hemorrhage occurred from them. Extensive and careful investigations have shown that this is not the real origin. The follicle, immediately after rupture, contains no blood or very little, and it is only after a menstruation has occurred that larger masses of blood are found in it. This could have been found out as well many years ago for no special modern methods of investigation were necessary, but—and here we come to another important thing—the once existing, apparently simple, and obvious explanation stops us from thinking much about other possible theories and so the problem is neglected. The new finding, namely, that the follicle immediately after rupture does not contain a considerable amount of blood, and that only the menstrual congestion starts the hemorrhage, immediately throws new light upon the difference between the corpus luteum of pregnancy and the corpus luteum of menstruation. According to Aschoff, in whose laboratory these investigations have been made, the longer life of the corpus luteum graviditatis can be explained by the absence of recurring menstrual hemorrhages, which always partly destroy the yellow body. This must make us a little doubtful concerning the reputed special function of the corpus luteum in pregnancy, since no biochemic relations of a special character are any longer required to explain its persistence. Here, again, important new conclusions are drawn simply as the result of our giving up an apparently well-established explanation of a single phenomenon, the true nature of which could have been easily established.

The conception of essential differences between the right and the left side of the body and explanations for their existence form important chapters in the history of scientific thought, far too extensive to be discussed here. But even outside of the already mentioned pyelitis problem this question must concern the gynecologist. Varicocele in the male is explained by the fact that the vena spermatica interna is a narrow vessel, running blood straight upward against gravitation. A varicocele is decidedly more frequent on the left than on the right side. The usual explanation for this fact is that on the left side the spermatic vein generally empties into the vena renalis, while on the right side it goes directly into the vena cava. Emptying under a right angle as on the left side is considered to offer a greater obstacle to the blood stream than the emptying under an acute angle, as formed by the spermatic vein and the vena cava on the right side. The ovarian veins in the female, however, behave in their upper portions exactly like the corresponding spermatic veins do in the male and, nevertheless, vari-

cosities in the tributary plexus are not more frequent in the left side than in the right, at least I never saw any difference either in operative specimens or in postmortems. If there is a real hemodynamic difference it ought to manifest itself in the female pelvis, with its frequent and intense congestions, at least as much as in the scrotum. So we have to subsume this asymmetry in the occurrence of varicocele under the many facts still unknown about asymmetries, among which right-handedness is the most important and most puzzling. The fact that varicocele occurs in man frequently and seldom in woman probably finds its explanation in the different topography, since in contrast to woman the plexus in man together with the descended testicle is located outside of the pelvis. However, I would not dare to insist on this explanation: first, because the prevalence of varicocele on the left side points toward some unknown factors in the origin of this condition and, secondly, because frequently certain variations in the pathology of man and woman have been shown to be due to other than apparently simple mechanical differences.

One example may demonstrate how pathologic conditions which seem to have no relation at all to sex are nevertheless practically restricted to one sex. Diseases of the spleen are at least as common in women as in men, perhaps even more frequent; rupture of the spleen in cases of malaria makes no exception to this rule. However, of the thirty-two ruptures of the spleen in typhoid fever, which have been reported in the last century, thirty have occurred in men. This fact is fully beyond the limitations of mere coincidence since these instances have been collected from the literature of an entire century, and reported from different countries, so that all accidental influences upon the statistics seem excluded. We are compelled to deduce that femininity of the patient implies some factor which inhibits this generally fatal complication, or vice versa, that masculinity in itself occasionally predisposes the patient to this accident. Far-fetched as this theory seems, it is nevertheless acceptable. One observer emphasizes that in most of these typhoid cases the intestinal ulcerations are found to be surprisingly small in comparison with the severe changes leading to rupture. Thus, we must assume in such cases a difference in the reaction of the body towards the typhoid bacillus, and it is quite logical to ascribe it to constitutional changes connected with the sex of the patient.

Constitutional differences between the two sexes are evident long before puberty, even long before birth. I do not want to lay too much stress on the fact that the prevalence of male over female fetuses in abortion has been ascribed to a more likely disturbance in the hormonal relations between the mother and a male than a female fetus. Other differences undoubtedly exist but, at least for the present, they defy our attempts of explanation.

Congenital cardiac malformations in their varying forms are much more common in male than in female children. It is obvious that no mechanical hydrodynamic differences exist between the circulatory system of the male and female fetus. Every observer must therefore admit that the difference in this case must be due to constitutional variations in the two sexes long before the age of puberty. However, there is still another problem: one congenital malformation of the heart, namely, the patency of the ductus arteriosus, is more frequent in girls than in boys. This not only proves again the complexity of developmental interrelations but it leads to a further question worth considering. The normal closure of the ductus arteriosus, a part of the tremendous changes taking place at the time of birth, as most of them, has been explained on a mechanical basis. The sudden increase in the afflux of blood to the lungs and the subsequent decrease in the amount of blood passing through the ductus are believed to play the chief rôle in the normal obliteration of the ductus arteriosus. A case reported in the literature, however, proves that this explanation is not valid. In this case a pulmonary artery was not present and all the blood of the lungs had to go through the patent duct during the eight days that the child lived. Nevertheless, at that time the duct was so obliterated that the child was doomed to die. In this instance there was no decrease in the blood volume going through the ductus arteriosus; on the contrary, the respiration of the living child increased the blood flow but, nevertheless, the duct was obliterated and, therefore, this process can be explained only as one link in the chain of developmental processes which occur in accord with inherited laws regardless of the outcome of the individual case.

Accepting, too willingly, simple mechanical theories is by no means a characteristic of our technical era. Even in ancient times when vitalistic doctrines certainly flourished, such mechanistic conceptions were adopted, as for instance, by Hippocrates at the very beginning of medicine as a science, and by François Xavier Bichat at the onset of experimental medicine. In the time of Hippocrates, it was believed that the child at term expels itself from the womb by stemming its legs against the uterine fundus. What do we think today about such a theory? How may coming generations think about many of our modern doctrines? The few examples which I have cited here could be readily augmented by anybody who has interested himself in the history of medical thought. To do away with theories which can be proved to be wrong is essential to open the way for better ones. As long as a generally accepted theory remains unchallenged, the chances are slim that someone will try to propound a better one. From this viewpoint, we should be ever aware of our obligation toward the students we are teaching; we must not transmit into their heads and notebooks anything that is no longer compatible with our best scientific information.

LYMPHANGIOMA OF THE FALLOPIAN TUBE

BY LAWRENCE W. STRONG, M.D., NEW YORK CITY

(Consulting Pathologist at the Woman's Hospital)

THE occurrence of a lymphangioma in the fallopian tube is sufficiently rare to justify a report of two cases which have been found in the routine examination of tissues at the Woman's Hospital.

The literature on the subject contains but five cases, four of which are referred to in Veit's *Handbuch der Gynaekologie*, v, 190 and also in Liepmann's *Handbuch*, ii, 177. The fifth case is one of O. Frankl's described by Leighton in the *American Journal of Obstetrics* for 1912, and also referred to in Liepmann's *Handbuch*.

Since the distinction between a lymphangioma and a local dilatation or lymphangiectasis may be regarded as rather indefinite, it is important to note that these five reported cases are all described as true tumors by Frankl, and by Fromme and Heynemaun who wrote the article for Veit's *Handbuch*.

Dilatations of preexisting channels do not take the form of circumscribed nodular tumors; and they occur only where there is a physical cause, namely, the accumulation of secretions or foreign matter requiring removal. No such static conditions were present in the accompanying cases; the tubes were in all other respects normal.

A brief description of the two additional cases is here given:

CASE 1.—Path. No. 18104. A married woman, forty-eight years of age was admitted to the service of Dr. Ward for an abdominal tumor. At operation a large symmetrical tumor of the ovary was found, and a complete hysterectomy was done.

The pathologic report described a uterus of normal mucosa. One ovary was replaced by an irregular solid tumor of dense fibrous tissue extending into the ligamentum ovarii almost to the tube corner. About 1 cm. from the isthmic extremity of the tube and embedded in its wall was a firm nodular tumor of about 5 mm. diameter. Microscopic examination of uterus and ovarian tumor showed fibrosis of the myometrium and a fibroma of the ovary. The nodule in the tube showed obliteration of the tubal lumen with replacement by fibrous connective tissue and round cell infiltration. The nodule itself consisted of a mass of lymph spaces lined by a regular endothelium which here and there was undergoing proliferation. The nodule was surrounded by normal musculature.

CASE 2.—Path. No. 24096. A married woman, fifty-two years of age was admitted to the service of Dr. Grad for pelvic pain and hemorrhage. At operation a retroverted uterus was found, giving a purulent discharge from the os. A complete hysterectomy was done.

The pathologic examination showed a large, boggy uterus with a stenosed internal os. The ovaries were somewhat enlarged and showed numerous cysts of the follicles. The tubes were of normal size, moderately convoluted, and a well-defined hard nodule was felt in the wall of one. A section of this nodule was taken.

Microscopic examination of this nodule showed a reticulum of connective tissue with large spaces of rather uniform size lined by a simple flat endothelium showing no tendency to proliferate. The nodule is about one half cm. in diameter. The margins merge without definite boundaries into the connective tissue of the tubal wall.

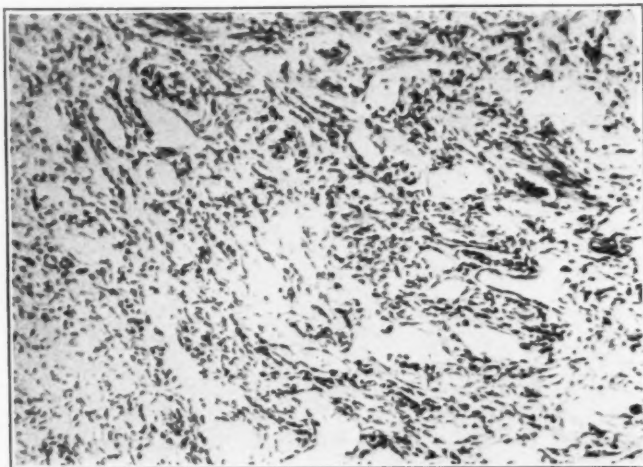


Fig. 1.—18104—Lymphangioma of tube.

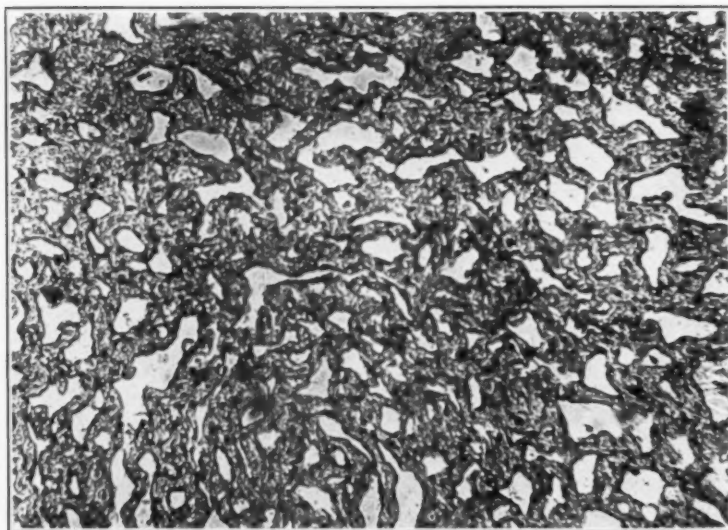


Fig. 2.—24096—Lymphangioma of tube.

In both these cases a localized nodule was observed macroscopically and removed for microscopic examination, which makes them entirely comparable with the five cases already reported. It would appear that these two were as distinctly tumors as are the ones recognized by Frankl and others, although they were perhaps smaller than some. Leighton speaks of Frankl's case as the smallest.

The descriptions of all the seven cases, including the present two, so closely resemble each other that the inference may be drawn that this is a characteristic, even though very rare, neoplasm of the fallopian tube. Its small size and the fact that it has always been an accidental find make it plausible that its rarity is more apparent than real.

There is nothing in the clinical history of these cases which has any apparent bearing on the tumors.

The two of the present report are, however, of value because they were not associated with myomata as were all the previous ones. This controverts the inference made by Leighton that there is a relationship between the lymphangiomata and myomata. Both of my cases were associated with inflammatory conditions, although in both instances the tubes were of normal size with patent fimbriate extremities.

The fact that myomata or adnexal disease was present in all cases indicates nothing more than a condition for which an operation was undertaken, without which the lymphangioma would have remained undiscovered. These tumors have occurred both in the isthmus and ampullary portions of the tube. They have all been of small size and oval in shape. It has been suggested by Kermauner that they were potentially malignant, on account of the proliferation of endothelium, and he has therefore related them to endotheliomata. There is certainly no appearance of malignancy in the present cases, and they are to be regarded in the same light as lymphangiomata of the skin and elsewhere. A certain amount of proliferation of endothelioma, however, is characteristic of all lymphangiomata.

CASE OF PREMATURE LABOR WITH SURVIVAL OF THE CHILD

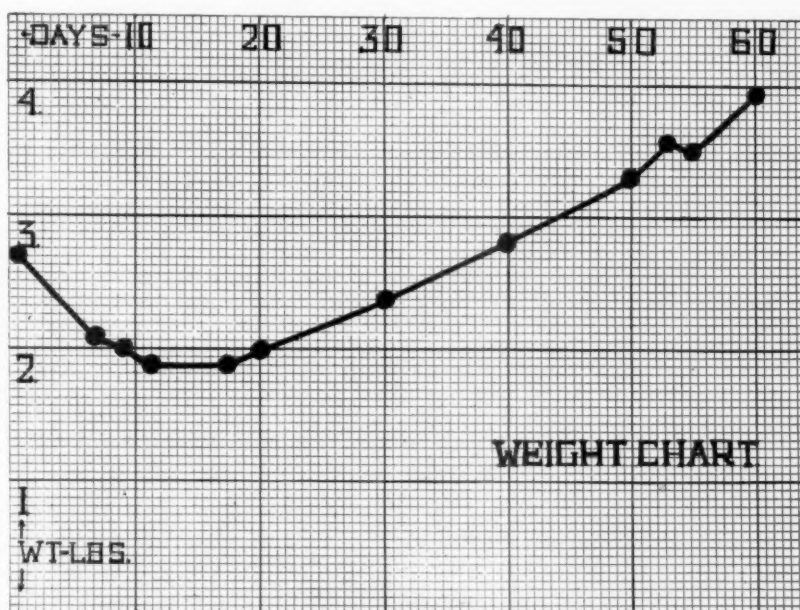
BY EDWARD C. LYON, JR., M.D., NEW YORK CITY
(*Junior Attending Surgeon at the Woman's Hospital*)

THE survival of infants born very prematurely is sufficiently uncommon to warrant the reporting of an additional case, especially as the mother in this instance is an intelligent woman and gives a definite history from which it is possible to estimate with considerable accuracy the length of her pregnancy. Although this baby had a very precarious existence at the start, and overcame many vicissitudes, he is now at sixteen months a strong, sturdy boy, apparently normal in every respect.

From the second month of her pregnancy, the mother of this infant was followed in the Prenatal Clinic of the Woman's Hospital, to which she reported every two weeks. She was an Austrian by birth, twenty-nine years of age, married ten years, with a history of two full term normal deliveries, followed by one spontaneous miscarriage at four months. Nothing abnormal was found on physical examination, except a moderate hypertension. This varied throughout her pregnancy from 135/78 to 145/80. Her Wassermann was negative. Menstruation had always been regular every twenty-eight days, lasting from four to five days. The last period was June 14, 1923, occurring at the regular time. The amount of flow and duration of this period were normal. The patient is positive of both the date and the character of this period. When examined on August 24, in the clinic, a notation on her chart states, "The uterus is size of two months' pregnancy." On December 11, 1923, she was admitted to the ward with a history of ruptured membranes. She was observed for four days and discharged, having had during this time no escape of fluid, no flow, no pain, and the cervix being long and closed. On December 21, she was readmitted because of abdominal cramps and vaginal bleeding, probably about four ounces in all. The patient was in good condition, the cervix admitted one finger, no placenta was felt, and the diagnosis was "accidental hemorrhage from premature separation of the placenta." The patient was put to bed and observed. On December 23, she went into active labor, and at the end of six hours was delivered normally. The placenta was soft and mushy, small in size, and at least two-thirds of it was a pale pinkish color and bloodless. The pathologist's report states, "Placenta with regressive changes." The moderate hypertension, the accidental hemorrhage and the condition of the placenta, supported the diagnosis of partial premature separation of the placenta.

The baby at birth weighed two pounds and eleven ounces, measured thirty-five centimeters long, and appeared to be very premature and weak. Because this baby survived, the duration of the pregnancy becomes the chief point of interest. The last period of this patient began on June 14, and her delivery occurred on December 23, making the delivery exactly twenty-seven weeks and three days, or one hundred and ninety-two days after the first day of her last period. This June period was normal in duration and amount, and was preceded by periods occurring regularly at the expected time and also normal in duration and amount. If conception in this case occurred before this June period, it seems fair to assume that it was at a time nearer the June period than the preceding one in May. We have all seen pregnant women who at the regular menstrual time have had a more

or less altered flow; usually this is lessened in both amount and duration, often being a mere spotting. Rarely does a period normal in time of onset, duration, and amount of flow occur coincident with a pregnancy unless conception has occurred just prior or near to that period. It seems logical in this case to place the outside limit for conception at not more than three weeks prior to the flowing in June and most probably only a few days before, which would make the maximum duration of pregnancy from two hundred to two hundred and ten days. The baby was thirty-five centimeters long, which by the usual computation would make the pregnancy seven lunar months or one hundred and ninety-six days, a method that we know is not accurate, but which with other facts is often helpful. With this data, is it justifiable to consider that we have two hundred and ten days, or thirty weeks, as a possible maximum for the duration of this pregnancy and more probably around two hundred days, or between twenty-eight and twenty-nine weeks as



the actual length? We have felt that though not proved, such an assumption is within the realm of probability.

After delivery, the child was oiled, rolled in a cotton jacket, and placed in a hot bed. At the Woman's Hospital we do not use incubators or an incubator room, but care for our premature babies in the open nursery. The temperature of the bed was maintained by means of an electric pad, and determined by a thermometer which was kept in the bed. The baby soon showed the need of fluid, and on the second day received 20 c.c. of saline solution subcutaneously, while on the third day, 20 c.c. were given intraperitoneally. Saline solution was again given on the eighth, tenth, eleventh, fourteenth and sixteenth days, usually intraperitoneally. The mother had but little milk, but all that could be obtained from her was removed by a breast pump and fed to the baby. When it was seen the mother could not supply milk, an active propaganda was started among all nursing mothers in the hospital, both ward and private, and for a time all went well, breast milk being obtained from many patients in varying amounts. On the twenty-first day, the supply of breast milk was less than required, and feedings of part breast milk, and part formula were begun. After this, on some days the baby received all for-

mula, occasionally all breast milk, but usually a combination of the two. From the fifty-fifth day the feedings were entirely of formula. The baby weighed two pounds and eleven ounces at birth, and was discharged on the ninety-seventh day weighing six pounds and seven ounces.

This case has been followed carefully since discharged from the hospital, and the last report at sixteen months, stated the baby then weighed twenty-one pounds and five ounces. The accompanying chart graphically shows the weight curve from which it can be seen that for over a week the baby's weight remained at one pound and fourteen ounces. We have had at the Woman's Hospital no other case as premature as this one, in which we succeeded in raising the baby.

INTRALIGAMENTOUS PREGNANCY*

DISCUSSION WITH REPORT OF A LEFT INTRALIGAMENTOUS FULL TERM PREGNANCY WITH PREOPERATIVE DEAD FETUS—MOTHER LIVING

BY WILLIAM T. KENNEDY, M.A., M.B., (TOR.), NEW YORK CITY
(*Junior Attending Surgeon at the Woman's Hospital*)

IT is not my purpose to submit a complete review of the subject or include all the cases so far reported in the literature but to briefly learn from a study of the patients who have been operated upon, what is the best procedure, whereby we may first save the mother and if the child has reached viability and is still alive, to obtain a living child. All statistics have not clearly separated those patients having living babies from those having dead babies before operation. Rosenblatt¹ reports 86 cases of abdominal pregnancy, bringing, he says, the literature to date, making 295 authentic cases of advanced abdominal pregnancy. Of Rosenblatt's 86 cases, 11 were intraligamentous and of Sittner's² 184 cases of abdominal pregnancy, 39 were intraligamentous. Of Sittner's 39 intraligamentous cases, 24 were unruptured and 15 ruptured at the time of operation. Rader³ reports a case in which both mother and child were living, and he, after having made a careful study of the literature, says his case is the 160th in which the mother and child both lived. Hence, of 270 abdominal cases, 50, or 18.5 per cent, were intraligamentous.

FREQUENCY IN ECTOPIC STUDIES

Farrar⁴ analyzed 309 cases of ectopic gestation in a period of ten years at the Woman's Hospital and found three advanced abdominal pregnancies. Lewis⁵ analyzed 183 cases, reporting 2 which were progressing to advanced pregnancy. Luker⁶ found 1 advanced among 253 ectopic pregnancies. Mason⁷ found one ovarian advanced pregnancy in an analysis of 400 cases. Williams⁸ reports four advanced cases in 276 ectopic pregnancies and De Suvo reports 2 advanced cases in 52 ectopic pregnancies.

*Read before the Section of Obstetrics and Gynecology, New York Academy of Medicine, May 19, 1925.

Total, 13 advanced abdominal pregnancies in 1,473 ectopic pregnancies, or 0.885 per cent.

FREQUENCY IN PREGNANCY

Harris¹⁰ says Brandl believes that abdominal pregnancy occurs once in 12,000 cases while McPherson¹¹ reports 3 advanced abdominal pregnancies in 75,000 admissions. The average of these figures would be 1 in 18,500, or 0.0054 per cent. Graffagnino¹² rather changes these figures by reporting 11 cases in 18,835 cases, or 1 in 1,712, almost 10 times the figures of the other authors.

Since intraligamentous pregnancy is calculated as 18.5 per cent of abdominal pregnancies going to full term and since abdominal pregnancies are 0.885 per cent of all ectopic pregnancies then intraligamentous pregnancy should take place 0.163 per cent, or 1 in 613 cases of ectopic pregnancy.

I take the opportunity here of inserting a case of intraligamentous pregnancy reported by Ellison¹³ which had ruptured before operation, where the ovum was developing between the layers of the right broad ligament in the form of a cone-shaped mass with its apex pointing to the middle of the isthmic portion of the tube. The ovum had ruptured, forming a retroperitoneal clot extending from this cone to the pelvis, from the iliac fossa up to the kidney. The tube was removed, was reported normal and chorionic villi were found between the layers of the broad ligament.

HISTORY

Symptoms.—(1) Amenorrhea.

(2) Pain, quite acute (without shock as occurs in the hemorrhage into the peritoneal cavity), appearing from the sixth to tenth week of pregnancy and gradually subsiding.

(3) Occasional attacks of pain in later pregnancy which are not sufficient to keep the patient in bed.

(4) Abdominal enlargement.

Signs.—In the early months are:

(1) Acute tenderness of the fundus and the parametrium into which the ovum has ruptured.

(2) Thickening of the broad ligament to simulate an ectopic pregnancy further advanced than the history indicates.

(3) Fundus enlarged but does not conform to the amenorrhea.

In the later months there are:

(1) Fetal movements and fetal heart sounds.

(2) Abdominal enlargement almost corresponding with the history.

(3) Fundus can be felt on the side opposite to the pregnancy.

(4) Uterine souffle only audible over the uninvolved broad ligament. (Goff.)

(5) Cervix retracted with the fundus to be in a position high above the symphysis and inaccessible.

(6) Culdesac bulges, does not fluctuate and feels like a dense spongy substance.

(7) Radiograph to illustrate position and bony arrangement to determine whether the child is living or dead.

DISPOSITION OF THE PLACENTA

The references in the years 1922, 1923, and 1924 to intraligamentous pregnancy in the *Index Medicus* were investigated but all the literature was not available. In this period there were 33 cases of advanced abdominal pregnancy which were studied. Of these, 12 had dead babies and in 4 cases nothing was said about the placenta. This leaves 17 cases to consider. Of the 17 cases the placenta was removed and the abdomen closed in 11; in 3, the placenta was left and the abdomen closed; in 2 cases the placenta was left to come away, the abdomen being drained; and in 1 case the placenta was removed both by vaginal and abdominal operation. Table I illustrates the mortality percentage during this period.

TABLE I
MORTALITY PERCENTAGE FROM 1922 TO 1924

PLACENTA	CASES	DEATHS	MORTALITY PER CENT
1922-24			
Removed	11	0	0
Left with closure	3	1	33.3
Left to come away with drainage	2	1	50.
Vaginal-abdominal operation	1	1	100.
Average Mortality—17.7%.			

A comparison of these figures can be made with those reported by Beck¹⁴ in operations performed during the years from 1809 to 1919.

TABLE II
MORTALITY PERCENTAGE (BECK) FROM 1809 TO 1919

PLACENTA	CASES	DEATHS	MORTALITY PER CENT
1809-1919			
Removed	159	34	21.3
Left	98	55	56.
Average Mortality—34.2%			
1890-1919			
Removed	137	23	16.7
Left to be absorbed	12	4	33.3
Left with drainage	52	22	38.7
Average Mortality—24.4%.			

Rosenblatt reports 22 cases with 2 deaths of all cases where the placenta was removed and the abdomen closed. Prowossud,¹⁵ reporting 190 cases in 1910, gives a general mortality of 36.7 per cent. Of these, when the placenta was removed and the abdomen closed, mortality was 25 per cent; with marsupialization and drainage, the mortality was 27 per cent; and with marsupialization without drainage, the mortality was 45 per cent.

Hence, for all periods we find that the mortality is least in cases where the placenta was entirely removed and the abdomen closed and is greatest in those cases where the placenta was left and allowed to come away with drainage, except in one instance where the percentage cannot be easily calculated as there is only 1 case where both vaginal and abdominal operation was done.

REPORT OF THE CASE

Patient, married eight years, had one pregnancy six years ago, with a living child. She has been in general good health with no history of any pelvic inflammation since that time. There was slight endocervicitis; Wassermann negative. She came to be examined, after having missed two menstruations, on account of a sharp sudden pain in the lower left quadrant of the abdomen. At that time a question of left salpingitis was considered on account of the thickening of the left perimetrium. The pain gradually passed away and the patient was comfortable for about one month. She entered the hospital for daily observation for one week, when diagnosis was made of intrauterine pregnancy with corpus luteum cyst of the left ovary. The patient left the hospital and the abdomen continued to enlarge corresponding to the advancement of a normal pregnancy. In the beginning of the ninth month the patient came in, stating that she had not felt life for four days. On examination no fetal heart could be heard. A mass to the right of the pregnancy did not seem unlike the uterus. The cervix was high and inaccessible. The uterine souffle could be heard only over the right broad ligament. The culdesac was bulging and there was considerable pressure over the rectum. It was decided that the pregnancy was not normal so an x-ray was taken to determine the position of the child. It was found to be a breech presentation with the sacrum very low in the pelvis. (R.S.A.) The patient was then prepared for transfusion at the same time that operation would be done.

Findings at operation: After a left rectus incision was made, the mass containing the fetus was fully exposed. The fetus could be seen through a thin membrane which was unruptured and did not look unlike peritoneum. On further examination the uterus was closely related to the sac on its right, and on the middle of the sac posteriorly, could be traced the sigmoid. On opening the sac at its thinnest portion a fetus weighing 6 lbs. 12 oz., dead, but very slightly macerated was removed and there was no hemorrhage. By gentle separation the placenta was removed entirely from the left broad ligament without any hemorrhage and the sac was closed after inserting a drain into the vagina. The abdomen was closed without drainage. The patient made a normal convalescence and the drainage sinus closed in about one hundred days.

CONCLUSIONS

(1) In view of the fact that hemorrhage is the first most serious consequence at operation all preparation should be made to transfuse a patient before operation.

(2) In view of the fact that the greatest mortality is accompanied by packing and drainage of the abdominal incision, every effort where possible should be made to close the incision following careful ligation for hemorrhage.

(3) Intraligamentous pregnancy lends itself to drainage better than abdominal pregnancy because the peritoneum can be sewed to the incision making the drainage extraperitoneal.

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Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D.

THE MINNESOTA MATERNITY AND INFANCY PROGRAM

BY E. C. HARTLEY, M.D., ST. PAUL, MINNESOTA

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AND

RUTH E. BOYNTON, M.D.

(Director, Division of Child Hygiene, Minnesota State Department of Health)

THERE is naturally a considerable similarity in method among the states in carrying out the provisions of the Sheppard-Towner law.

An analysis of several of the methods used in Minnesota by the Division of Child Hygiene of the State Department of Health will show some tendencies in the relations existing between the state organization, the physicians and nurses, and the women of the state; these being the parties most concerned. To us, the significance of the analysis lies in its demonstration of the existence of and the growth of a community conscience in this field of hygiene.

I. *The Correspondence Course in the Hygiene of Maternity and Infancy.*—This correspondence course of fifteen lessons covering the subject of the Hygiene of Maternity and Infancy was prepared by one of us (E. C. Hartley), in collaboration with the Departments of Obstetrics and Pediatrics of the Medical School of the University of Minnesota. The object of this course is "to give a brief outline of some teachings upon which sound obstetrics and pediatrics are based."

The first eight lessons of the course cover the subject of maternal hygiene, the last seven the care and feeding of the baby. The subject matter covered by each lesson is as follows:

1. Introduction: Object of course—mortality rates.
2. Anatomy and physiology of pregnancy.
3. The unborn child.
4. Prenatal hygiene, Part I.
5. Prenatal hygiene, Part II.
6. Complications and accidents of pregnancy.
7. Confinement and preparations for confinement.
8. Labor and the lying-in period.
9. Breast feeding and early care of the baby.
10. Care of the baby.
11. The well baby; the nursing mother.
12. The sick baby.
13. Weaning and later feeding of the child.
14. Growth and development, Part I.
15. Growth and development, Part II.

At the end of each lesson is a set of ten questions, which are answered in writing, and returned for correction. After the written answers have been corrected

by a physician, they are graded and returned to the woman. On the whole, the papers of these women show an intelligent interest in the subject. Upon the completion of the fifteen lessons, a certificate is issued.

Through the cooperation of the Extension Division of the University of Minnesota, this course is issued through their regular channels, just as any other correspondence course which the University gives.

The accompanying charts were made from an analysis of the registrations for this course from January 10, 1923 to January 10, 1925, the total registration for this period being 5,546. These charts indicate the type of women taking the course, and something of their qualifications to inspire and maintain a changing attitude in their communities upon the subject.

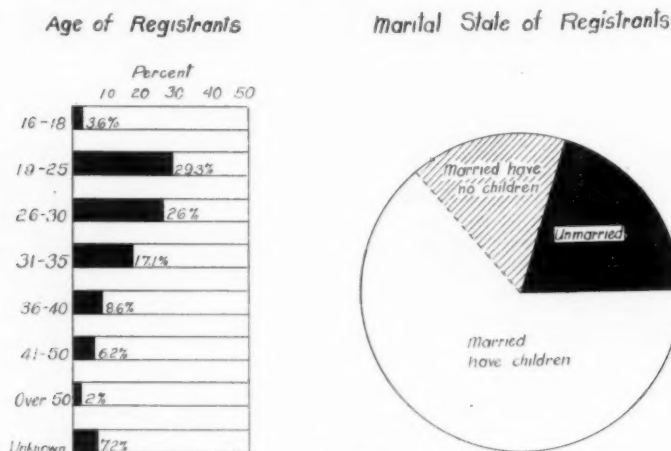


Chart 1.

EDUCATION OF REGISTRANTS

	No.	Per Cent
Not indicated	619	11.8
Less than eighth grade	100	1.8
Finished eighth grade	1999	36.2
High school graduate	1541	27.2
Normal school graduate	930	16.4
College graduate	357	6.6
Total	5546	100.0

Chart 2 shows that the majority of the women are mothers of one or two children. Over 80 per cent of the registrants have children under six years of age.

Chart 3 indicates the preponderance of registrants in rural districts, where not only a higher infant mortality, but an absence of the numerous charity welfare institutions of the larger cities, renders a more indigenous and independent aid desirable. Seventy-eight per cent of the registrations came from 570 towns with a population under 5,000.

II. *Prenatal Letters.*—A series of nine monthly letters is sent to expectant mothers. One letter is sent for each successive month of pregnancy. In this manner each contains information on the hygiene of pregnancy which is especially timely for that particular month. In the first letter, and throughout the series, the importance of being under the regular care of a physician throughout preg-

nancy is emphasized. The questions of diet, rest, excretion, preparation for confinement, etc., are discussed.

In Chart 4, requests for this series of nine letters are grouped as to their sources, from physicians, nurses, and others. This represents a tendency which is seen in the other parts of our program.

It would appear that this method represents ideally a relation between physician and patient. The letters are, in fact, similar in substance to the small brochures issued by some obstetricians to their patients.

The increased proportion of requests from nurses during the last six months' period is due to the intensive work done by the Field Nurses of the Division at county fairs during the above period. The actual number of requests from physicians was the same as in the preceding period, though the relative number was slightly lower.

III. *The Prenatal Clinics.*—The emphasis in these clinics, held throughout the state in cooperation with the local physicians, is placed upon the preparation for

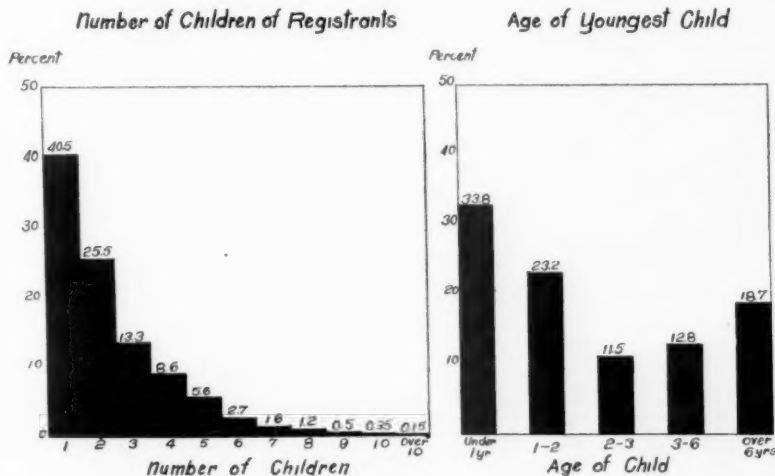


Chart 2.

confinement and the nature of the value of regular visits to a physician by the expectant mother. They constitute a "laboratory demonstration" of much of the material described in the prenatal letters and in the correspondence course.

The procedure at our prenatal clinics is as follows: At a meeting held with the physicians of the county, four or five towns in the county are selected in which the clinics are to be held. The week preceding the date set for the clinic, a survey of the prenatal cases in the community is made by a nurse from the Division of Child Hygiene with the county nurse, if there is one. Through the physicians and women who are interested in the clinic, names of prenatal cases are obtained. The nurse visits each one of these and invites the expectant mother to attend the clinic.

During the course of this preliminary visit, the nurse has an opportunity to discuss with the woman the reasons why she should go to her physician regularly for prenatal care. At this first visit, the nurse also leaves with each woman some literature on prenatal hygiene. The importance of this preliminary visit by the nurse is shown by the fact that approximately one-third of the prenatal cases visited come to the clinic. In one county in which such clinics were held 71 per cent of the sixty-two prenatal cases visited by the nurse before the clinic,

had not consulted a physician. All but seven of this group were past the sixth month of pregnancy.

The clinicians who have conducted these clinics have been specializing obstetricians. At the clinic, each woman is given a complete physical examination, including pelvic examination, urinalysis, and blood pressure reading. She is advised

Size of Town and Number of Registrants

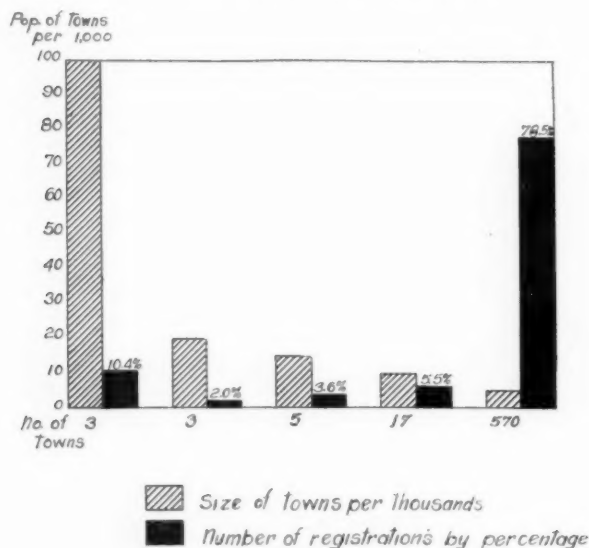


Chart 3.

of any condition for which she should see her physician at once, and is further impressed with the idea that she should go to her doctor for regular care throughout her pregnancy. After the examination, the nurse demonstrates to the expectant mothers the preparations which are necessary for a home confinement, and the

Prenatal Letter Requests

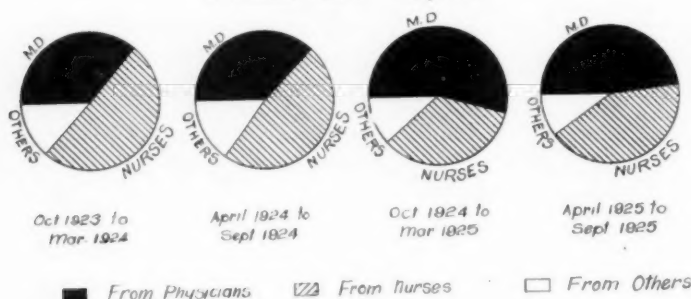


Chart 4.

physician gives a general talk on prenatal hygiene, to which all of the women in the community are invited.

IV. *The Midwife.*—During the summer of 1923, a survey of the midwives in Minnesota was made by the Division of Child Hygiene*. The results of this survey

*A Survey of the Midwife Situation in Minnesota, E. C. Hartley, M.D., and Ruth E. Boynton, M.D. Reprinted from *Minnesota Medicine*, June, 1924, pages 439-446.

have made us feel that the midwives in Minnesota are negligible as a factor affecting the maternal or infant death rate.

The findings of this survey were as follows:

1. The number of midwives in Minnesota is small; a total of 172 was found, of which 118 were licensed.
2. The number of midwives is decreasing, shown by the age groups and the absolute and relative cases attended by them. Less than 6 per cent of the total births in the state are reported by midwives.
3. Most of the midwives in this state are foreign born; they are a foreign importation not thriving well in this country.

V. *The County Nurse.*—In Minnesota, the number of county nurses is gradually falling away from the peak reached during the war. The withdrawal of support from the Red Cross accounts for a part of the decline. In so far as these nurses represent a salaried spur to a community conscience in hygiene, their passing need not be mourned—for this conscience must be inherent in the community

Infant Death Rate - Minnesota

*Deaths per 1,000 living births
1910-1924 inclusive*

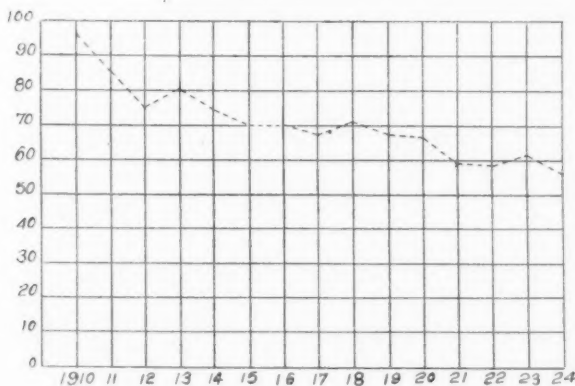


Chart 5-A.

Infant Death Rate

Mean for five year period

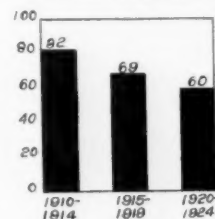


Chart 5-B.

mind; but in so far as they are instructors in the material upon which this conscience rests, the decrease in their number is a cause for concern. It may be that the local sense of responsibility in these matters no longer requires activating or stimulating agencies to maintain it; if so, the next few years should show evidence of that fact.

This evidence should appear in the records of this Division as an almost automatic continuation of some of the curves in Charts 1 to 4, and especially it should appear as a downward tendency in the infant mortality and maternal mortality curves in Charts 5 and 6.

VI. *The Sterile Obstetrical Package.*—Since experience teaches the necessity of clean delivery, and since doctors in rural communities complain that one of their big problems in obstetrical work in the country is the lack of sterile supplies for delivery, it has been one of the definite projects of the Division of Child Hygiene to introduce a sterile emergency obstetrical package in communities where the need exists. The package which has been approved and made up contains the minimum supplies needed for a home confinement. The materials for this package bought at regular retail prices cost approximately \$2.00. It contains:

- 1 delivery pad made of gauze and cotton,—36 x 36 in.
- 4 towels,—18 x 18 in.
- 18 gauze sponges,—4 x 4 in.
- 3 dozen perineal pads,—4 x 9 in.
- 2 sanitary belts.
- 6 cord dressings,—3 x 3 in.
- 1 tape for tying cord.
- 1 gauze band for baby,—4 x 18 in.

An appeal is made to civic, religious, and women's social organizations to undertake the making and distributing of these packages. Sterilization of the packages is done through the local physicians, whenever possible. Packages may be sent to the Division headquarters for sterilization when necessary. They are distributed by the group making them, either through the physicians, the local drugstore, the county nurse or some other agency more convenient to the particular community. An increasing use of these packages by the physicians of the state

Puerperal Death Rate - Minnesota

*Deaths per 1000 living births
1910-1924 incl.*

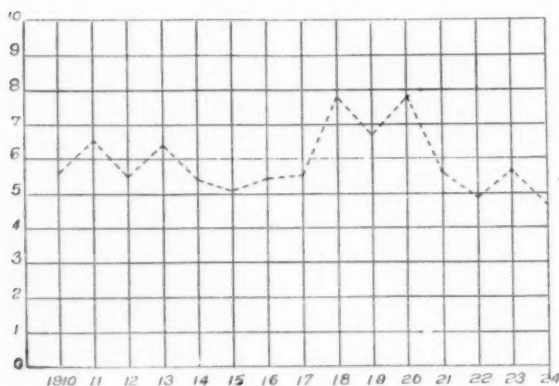


Chart 6-A.

Puerperal Death Rate Mean for five year period

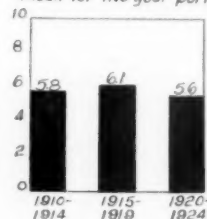


Chart 6-B.

is another indication of the approach to the ideal relation between the community and the physician.

The ultimate object of the work of this Division is thus to aid the growth of a community conscience in Maternal and Infant Hygiene by responding as accurately and as simply as possible to the desire for information in this field by the women of the state. The Division is encouraged in the progress of this growth by the following facts:

1. There has been a noticeable increase, especially during the past year, in the amount of literature on prenatal and infant care which the physicians of the state, at their own request, are distributing to their patients. This seems to us significant as it indicates two tendencies: (1) an increased sense of responsibility on the part of the physicians as to their part in this educational program, and (2) the growing tendency of the women of the community to ask for this type of information from their own physicians—obviously the only manner in which the dissemination of such information can be carried on permanently.

2. In addition to the increasing number of individual women who are seeking information about their care and the care of their children, there has also been

an increase in the requests from organized community groups for information and assistance in providing means of informing the women of that particular community about better maternal and infant care. These are tendencies which have impressed us with their increasing occurrence.

Before the work of the Child Hygiene Division was started, the program was presented to the State Medical Society, and endorsed by them. A physician from each county was selected by the State Medical Society to serve on a county advisory board consisting of five members, two of whom were physicians. The duties of this advisory board are "to plan and supervise the administration of maternal and infant hygiene in the county." The endorsement of the State Medical Society has been a factor in the development of this sense of responsibility and spirit of cooperation in the physicians throughout the state.

Society Transactions

JOINT MEETING OF THE NEW YORK AND PHILADELPHIA OBSTETRICAL SOCIETIES

PHILADELPHIA, APRIL 14, 1925

THE day was given over to a series of operative clinics held in various hospitals by Fellows of the Philadelphia Obstetrical Society. At the evening session DR. WILLIAM P. HEALY of New York presented an address on **Irradiation Treatment of Carcinoma of the Uterus**. (For original paper see page 789.)

DISCUSSION

DR. FLOYD E. KEENE, PHILADELPHIA.—The Memorial Hospital Staff have been pioneers in this country in radiotherapy and through their combined efforts have contributed largely to the subject. Their scientific and thorough work has been a potent factor in bringing about the general acceptances in the adoption of this form of treatment. I believe that Dr. Healy is correct in his statement that the hemorrhagic history is by no means an index to the extent of disease and he has also done well in calling our attention to lesions of the cervix which might develop later into carcinoma. While the term "precancerous" seems to me to be an improper term, such lesions as he mentioned are unquestionably of etiologic importance in the development of malignancy and should receive appropriate treatment. That complete hysterectomy should be done in all cases of myoma is, I believe, decidedly open to question. In the hands of a few perhaps, a total hysterectomy is attended with but little more difficulty and fraught with little more risk than the incomplete operation, but with most of us, I am sure I am correct in the statement that the more radical procedure is followed by higher mortality and certainly by a much greater morbidity. In our experience at the University Hospital, carcinoma of the cervical stump has been a very rare occurrence. I believe that if the complete operation were done as a routine procedure in all cases of myoma, the toll of death and suffering incident to disastrous sequelae would far exceed that of carcinoma developing upon the cervix which has been left behind. I have been disappointed in the fact that Dr. Healy did not go into more detail as to the effect of radium or x-ray in the various types of cancer of the cervix. Dr. Ewing has emphasized the fact that the basal cell carcinoma yields particularly readily to irradiation, and that largely because of this fact radium is especially valuable in the treatment of cancer of the cervix. Because of Dr. Ewing's teachings, I have looked upon the type of cell composing the carcinoma as being of important prognostic value and trust Dr. Healy will discuss this further in his closing remarks. In our earlier patients, Dr. Clark and I voiced the hope that operation for carcinoma of the cervix would in course of time give way to irradiation and I believe that this hope has now been realized. In forming our conclusions as to the benefit derived from irradiation, we must divide the results in two broad groups,—the palliative and curative. Unfortunately the great majority of cases of cancer of

the cervix fall under the former heading. Of the cases coming to our clinic for treatment, less than 10 per cent have been limited to the cervix. In this great class of incurables, we can hold out hope for cessation of hemorrhage and foul discharge in at least 60 to 70 per cent and very often for some unexplained reason there will be relief from pain. If the advent of radium has done nothing more than to bring this immeasurable, although often temporary, relief to this number of patients, it certainly has been an enormous boon to humanity. In the treatment of these advanced cases, we must use discrimination in selecting those adapted to irradiation. Wide extension of the cancer to the bladder and rectum, the frozen pelvis and profound cachexia, are contraindications to the use of radium, not only because it would cast discredit upon this form of treatment, but it often increases the patient's suffering. Statistics as to the curative effect of radium have come to hand only in recent years and a summary of these statistics from all parts of the world seems to show beyond doubt that irradiation is superior to operation in the treatment of cancer of the cervix. In a recent study made by Dr. Clark, he records the curability from operation as reported by the leading gynecologists of the world, and the five-year cure has averaged about 33 per cent. With irradiation alone, on the other hand, Schmitz reports a relative cure of 46 per cent, Bailey and Healy 40 per cent and Kelly and Bernheim 40 per cent to 50 per cent. Only recently Latzko reports as high as 80 per cent cures. Such results certainly seem to indicate that radium or combined radiotherapy have definitely displaced operative treatment.

In our work a twenty-four hundred milligram hour application has been the routine, at first repeated at intervals of six weeks but of late, repetition is dependent upon the conditions present. We have not combined x-ray therapy with irradiation. In the few in which we have used x-ray therapy our results have been very disappointing and because of this and the fact that these patients very often suffer intensely as a result of the treatment, we have not used it routinely. I have been very much interested, therefore, in Dr. Healy's discussion of the value of deep x-ray therapy and particularly the suggestion that evidence seems to point to the fact that the peripheral areas of the malignant growth are favorably influenced. About one year ago Dr. Clark reported 140 cases that had been treated five years or more; 27.3 per cent of the early cases were cured; 6.2 per cent of the advanced cases, with an absolute curability of 10.6 per cent. While these statistics do not compare favorably with those given by Dr. Healy, one might conclude on first thought that perhaps it was due to the fact that we used comparatively small doses of radium rather than massive irradiation and did not combine deep x-ray therapy with it. On the other hand, Heyman in his recent report before the American College of Surgeons, showed superior results to Dr. Healy's in that using a smaller amount of radium he obtained a 47.8 per cent relative cure and between 20 and 30 per cent absolute cure. I feel very strongly that the last word has not been said as to the best technic in the irradiation treatment of carcinoma of the cervix. If the final analysis proves that the best results are obtainable only by combination of radium and x-ray therapy, the day will have passed when these patients can be treated individually by the gynecologist or radiologist, but will demand the establishment of radiologic clinics where these various methods of treatment are available in the hands of experts along these special lines. I am in thorough accord with Dr. Healy's opinion regarding hysterectomy after apparent cure by radium. We have always followed the dictum that once irradiated never operate.

DR. GEORGE E. PFAHLER.—I am very glad Dr. Healy has called attention to the importance of treating those conditions, some of which at least, lead to cancer. I feel that if each one here will do his part toward helping to teach the general profession the importance of recognizing and thoroughly and properly

treating these early lesions, this meeting will have accomplished a great deal. It has been my opportunity recently to learn, in the city of Philadelphia during 1923-1924, more than one out of every ten deaths over the age of twenty, has been due to cancer, and one out of every eight over the age of forty has been due to cancer. I feel, as Dr. Healy has already mentioned to you, the importance of delivering the radiations into the tumor tissue or into the pelvis, in a reasonably short time; not as short as the German authorities have done because this was too destructive to the normal organs and tissues, but in ten days or three weeks. The irradiation by radium and x-ray should be combined but must be carefully balanced. Whether more radium or x-ray is used does not matter if the effects are balanced.

DR. CHARLES C. NORRIS.—Actual figures are always of value in relation to cancer, and for this reason I am presenting those secured in the four years' work of the Gynecologic Service of the Radiologic Department of the Philadelphia General Hospital. This department was founded in 1921. The Philadelphia General Hospital, is the City Hospital. Every patient who is a resident of Philadelphia must be accepted if they make application. We have, therefore, no privilege in the matter; the result is that our material consists largely of advanced cases, patients who have been unsuccessfully treated elsewhere; of recurrences and of bed-ridden or moribund individuals.

In the early days of our clinic we realized that we would necessarily get an extremely high percentage of advanced cases, and that if our end-results were to be of any value a careful classification of our material would be necessary. With this in mind we adopted the classification adopted by Schmitz, which is as follows: Stage I, cancer apparently limited to the cervix; Stage II, so-called border-line cases; Stage III, inoperable cases; Stage IV, frozen pelvis; Stage V, recurrences.

This is practically the classification employed by Greenough in his work for the American College of Surgeons. The following tables show the results secured:

Cancer of the Cervix: Total number of cases observed 183; now alive 40, or 21.8 per cent.

Owing to the advanced stage of the carcinoma it was impossible to treat all cases. This point has been stretched to the utmost and every patient to whom there has been any hope of even palliative results, has been treated.

Cancer of the Cervix: Total number of cases treated, 88; alive, 48 per cent.

STAGE	NO. TREATED	PERCENTAGE ALIVE
I	1	100
II	3	33
III	63	44
IV	12	25
V	9	22

Cancer of the Cervix and Method of Treatment

	NO. TREATED	ALIVE	PERCENTAGE
Radium	27	2	7
Radium and Radium Pack	13	4	30
Radium and x-ray	27	18	64
X-ray	21	10	47

The majority of patients listed as "x-ray only" had received radium irradiation before coming to the Philadelphia General Hospital.

In the series of 88 cases treated, only one vesicovaginal fistula developed.

Let me emphasize that the results presented are not end-results. We have a few three year cases, but the majority of the cases listed as alive have been treated recently. It is gratifying to state that at present we are getting cases earlier than formerly.

In closing I wish to acknowledge our indebtedness to the Follow-up Department. The 188 cases include every carcinoma of the cervix that has applied to the Radiological Department for treatment since it was inaugurated, and our follow-up is therefore 100 per cent.

Of the patients who have died during their stay in the hospital, over 75 per cent have been subjected to a thorough postmortem examination and in this way many valuable data have been secured.

DR. HEALY, (closing).—The use of irradiation is bound to vary in the hands of the individual worker. I do not do any of the x-ray work; that is all done by Dr. Herendeen at the Memorial Hospital. I merely decide what the patient is to have, whether she is to have low or intermediate voltage, that must be decided by me and not by the x-ray man. He carries it out exactly as I decide. As to the type of cell, we are absolutely unable to reach any decision. We see small cell types and large cell types. They are all polyhedral and transitional cells and are epidermoid squamous cell cancer in the opinion of Dr. Ewing.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

AN EPITOME OF THE HISTORY OF OBSTETRICS

By H. D. FAIR, M.D., MUNCIE, INDIANA

CHAPTER VI

WILLIAM HUNTER, AND AFTER

WILLIAM HUNTER, (1718-1783) was a Scotchman. Rather early in his professional career he began teaching and gave private instruction in dissection and operative surgery, and later became the leading obstetrician of his day. In 1768, he furnished, in London, what was known as an "Anatomical Theater and Museum." He gloried in hard work and delighted in debate and controversy. His most notable publication is the "Atlas of the pregnant Uterus." He described the decidua reflexa and the fetal circulation. He was opposed to the use of the obstetric forceps.

Dr. Shippen, of Philadelphia, a pupil of Hunter, was the first to give public instructions in obstetrics in the then new world, America. This was in 1762. His first class consisted of ten pupils.

In 1767 the Medical School in New York under the direction of King's, now Columbia college, was founded, with Dr. V. B. Tennant professor of obstetrics.

In 1756 the subject of the induction of premature labor as a substitute for craniotomy was first made a matter of discussion.

In the year of 1768, the plan of dividing the os pubis for the purpose of increasing the anteroposterior diameter of the pelvis, was proposed by Signault of France. This scheme was received with enthusiasm not only in France, but throughout the world. Calm investigation was out of the question and the inventor and operator was everywhere received with most distinguished honors. Notwithstanding that the patient, who had previously been delivered by craniotomy, barely escaped with her life, and sustained a severe injury to the bladder; on the strength of this one case the medical faculty of Paris voted a medal to Signault and a pension to his unfortunate patient. In England, the plan was first seriously investigated by Drs. Hunter and Denman, who reported against it and in a subsequent examination demonstrated that the division of the os pubis does not materially increase the anteroposterior diameter. Symphyseotomy had, however, done one good thing. It taught the profession to be more certain of facts.

In 1771, Saxtroph of Copenhagen published an essay which asserted that the long diameter of the head, contrary to all previous teachings,

entered the pelvis parallel to one of its oblique diameters, the sagittal suture running in a line from the sacroiliac synchondrosis behind to the foramen obturator in front. This was the beginning of the transformation of obstetrics from an art into a science.

Baudelocque, in the year 1791, methodically arranged the positions and presentations of the fetus, making twenty-two presentations and seventy-four positions. This classification was later modified; Naegele of Heidelberg started the present system of teaching.

A man who is but little known, yet one to whom great credit is due, was Thomas Denman, a Scotchman who died in 1815. He was author of a textbook on midwifery that passed through six English and three American editions. He first proposed the present approved treatment in cases of retroverted uterus. The excitement of premature labor for the preservation of both mother and child, in case of deformed pelvis, was originally suggested by him. In convulsions, when pulse was slow, he advised copious bleeding instead of nervines. His treatment of postpartum hemorrhage and suggestions regarding the use of instruments stand to this day.

In 1807 the discovery of the peculiar virtues of ergot in exciting uterine contractions was made by Dr. John Stearns of New York. Many and long were the controversies respecting its virtues. In 1818, Mayer, of Geneva, first applied auscultation in the diagnosis of pregnancy.

The senior Dr. Bigelow of Boston was the first to administer chloroform in labor, in this country, and the wife of our poet Henry Wadsworth Longfellow was his patient.

I purposely refrain from referring to the art of obstetrics as taught in the leading colleges of the world at the present day for there are many sources from which one will or can gain the knowledge, neither shall I mention the many instruments, appliances, and facilities in general use by the profession and laity, but I will devote the balance of the paper to mention some of the methods practiced in the remote corners of the earth.

The different races of man have their individualities and to the student of human nature, the study of their peculiarities is instructive as well as interesting; but before taking up the consideration of the present-day customs in different parts of our globe I wish to call attention to the lying-in chambers of royalty as they appeared centuries ago. Probably many of the readers are aware that formerly there was no such thing as privacy connected with the birth of the heir to a throne. There are several reasons for this. One of the most important of which was the attempt to guard against substitution. Not infrequently had a sturdy child of some subject been substituted for a weakling or a stillborn prince. Again when the populace was clamoring for a male heir, it was very convenient for the unfortunate queen, who could not always control the sex of her progeny, to have some discreet friend who was willing for a consideration to make an exchange. Again, the birth of a king was an official act, and as such, demanded official witnesses. It was ordinarily demanded that no less than three court officials besides the physician, nurse, midwife and the king himself, be present at the accouchement. They did not sit with their faces to the wall but crowded about the royal couch and noted the details of the event as it progressed step by step.

It is related that on one occasion when the assemblage was lending its august presence to the delivery of a queen, the visitors became weary with the delay and on the assurance of the midwife that there would be nothing doing for several hours, the officials retired leaving the physician, nurse, midwife and king with the sleeping queen. She suddenly awoke and with a few severe pains fulfilled her destiny. Now the king was in a quandary. No one was present who could bear official witness. The king rushed from the room and encountering a guard or sentry rushed the bewildered man into the room and up to the queen's bedside. The covers were removed and there, revealed to his astonished gaze, was an infant lying between the royal lady's thighs. This was not enough; he was ordered to raise the cord and testify that he saw where it entered the mother's body. Thus was the law satisfied.

The physician and midwife to the royal family occupied an unenviable position although it was one much sought after. Any ignoramus who was fortunate enough to be in attendance at a perfectly normal and satisfactory delivery would enjoy court favor and all its attendant prestige; while a thoroughly competent physician who might preside when the inevitable complications arose was in danger of losing his professional if not material head.

CHAPTER VII

POSTURE

Will the study of obstetric customs of the past and among primitive peoples lead to valuable results which would serve to guide the present-day practice? Take, for instance, the matter of posture. Is there a position that the primitive woman will instinctively assume when in parturition? It is said that Naegele sought an answer to this question by secretly observing the movements of an inexperienced girl who was left alone while in pain in a room furnished with a bed, chair, sofa and rug. The girl took all possible positions and was finally delivered while tossing about on the bed.

Rigby asserts that accidental circumstances determine largely the position which an unassisted parturient assumes when seized with violent pains. There is no question but that parturition is largely instinctive, and if we wish to avoid mistakes resulting from culture and training which may exclude both reason and instinct, we should look to the woman who is governed by instinct and not by prudery or any other factor.

Engelmann probably went into this matter more deeply than any other and concluded that the squatting position, such as is assumed in defecation, was the most common. Our lithotomy position with knees to the abdomen and legs flexed on the thighs is practically the same thing. But this position lacks much of being universal.

Goodell, Ploss and others speak of the kneeling posture with the body inclined forward and resting on some support. H. F. Campbell tells of a Georgian negress who was found kneeling on a mat, with her head and elbows resting on the seat of a rocking chair; the thighs perpendicular, the body nearly horizontal. The fetal head had been born but the shoulders resisted. He found that during the pains the

body would move backward so that the buttocks rested on the heels, whilst in the interval she would glide forward to the original position.

Spense, in his *System of Midwifery* says, it was common among the early Scotch and English for the women to be delivered while kneeling beside a chair or bed, leaning on it with elbows or head.

The ablest physicians of old used to recommend the knee-elbow position for very stout women. This treatment is mentioned by Rhazes the Arabian, Hippocrates, Galen, and others, and it is still in use in parts of Russia, Greece and Turkey. According to Ramsbotham the peasantry of Ireland place themselves upon their hands and knees. Our own Dr. Parvin is credited with reporting such a case which received considerable attention, but I do not know where it was published.

When reading Gen. 30:3 where Rachel is speaking to Jacob—"And she said, behold my maid Bilhah, go in unto her; that she may bear upon my knees, and I may obtain children by her." I had wondered whether this attitude was taken because the women of that day were frequently delivered while sitting on the lap of another or whether this arrangement would enable Rachel to feel more fully that the offspring of Jacob and the maid was really hers. At all events, this posture was assumed in Rome and Egypt in the absence of the accoucher's chair.

Another posture given is "Prone upon the Stomach" which was common among the Greek Indians. When the fetus is about to be expelled the mother straps a wide belt around her chest allowing it to extend on to the abdomen. As labor proceeds the strap is buckled tighter and tighter until expulsion is complete, meantime the mother lies upon her face with her chest and abdomen across a pillow. After delivery she stands, resting her hands on a staff or other support, with her feet wide apart in order to let the blood flow more freely, and to let the placenta escape more easily.

In certain districts of central Africa, if labor is slow with the patient in the prone position, the child is hastened by kneading or tramping the back of the sufferer.

Probably the most useful procedure utilized by savages and primitive people for the distinct purpose of hastening a slow or difficult labor is the employment of the suspended position. This is practiced in different ways, all more or less advantageous. Among certain tribes of the Apaches of North America, the parturient is suspended by a lasso, well wrapped where it passes under the arms and around the back, and pulled up until the knees are well off the ground. If this procedure does not have the desired result an assistant grasps the patient around the waist above the abdominal protuberance and adds her weight to the strain. This seldom fails to force the fetal head into the pelvis, provided no obstacle of moment intervenes. With the knees only a few inches off the ground the utmost variation of the pelvic diameters to be obtained by posture is secured and might often be resorted to with advantage in our daily practice; for it has all the advantages of the Walcher position.

The care which is taken of a pregnant woman depends greatly upon her surroundings, and increases with civilization, but it is sad to note that dystocia increases in the same way. Rigby asserts that he finds easiest labors and the best results when the women continue

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The care which is taken of a pregnant woman depends greatly upon her surroundings, and increases with civilization, but it is sad to note that dystocia increases in the same way. Rigby asserts that he finds easiest labors and the best results when the women continue

their wonted employment until labor pains are upon them. It always goes worse with those who are idle beforehand with a view of saving themselves and making labor easier.

Engelmann said in 1883: "This statement we find constantly verified in our ordinary practice. It is the lady who is so conservative of her strength, and anxious to do everything within her power to promote her health and the welfare of her offspring, who suffers most."

CHAPTER VIII

CUSTOMS AMONG AMERICAN INDIANS. IN SOUTH SEA ISLANDS; YAP; PHILIPPINES; AMONG THE ESKIMOS, ETC.

Upon the isle of Yap, recently brought into prominence, and other adjacent territories, some preparation is made to ease the intensity and shorten the duration of labor pains. One month before delivery is expected the leaves of a certain plant, tightly rolled, are inserted into the os uteri. When moistened with the natural secretions they distend, and when fully expanded are removed, and a larger roll is inserted. This ought to shorten the first stage. It might be said also, that septicemia is practically unknown among these people.

The one great danger to the primitive woman in labor is the transverse presentation of the fetus. External methods of various kinds were employed, particularly by the Japanese, to prevent malposition but death is certain if labor is inaugurated with the fetus in such a position. Internal manipulations are practically unknown among primitive people. Rarity of accidents is most fortunate since neither our own Indians nor other savage tribes have any means of meeting them, save the incantations and howling of the medicine man.

In nearly all American Indian communities the medicine man is to be reckoned with. He erects his lodge a few yards away and when labor is begun, proceeds to exorcise the evil spirits supposed to be present and waiting to seek habitation in the child as soon as it is born. Dr. C. S. Moody says, "While this infernal racket is going on, the parturient woman is being led around the enclosure by two elderly squaws, with a midwife bringing up the rear, who at each paroxysm of pain grasps her patient around the waist and hangs her weight upon the abdomen. When the last stage is entered upon the quartette go to a tent set aside for the birth, where a pole about eight feet long is set upright in the middle of the tent. Near this is a circular hole, two feet in diameter, filled with hot stones. The woman kneels and grasping the pole assists nature by pulling down as the pains recur; the midwife squats in front and receives the youngster. The cord is severed at once and never tied. The delivery of the placenta is the signal for the mother to jump up, buckle on her belt and seat herself over the hot stones. This induces swift contraction of the uterus after which she is ready for a huckleberry picnic, a dead drunk or any little amusement that may present. The foregoing constitutes what takes place in every uncomplicated labor. In complicated cases the medicine man redoubles his noise; the old women tear their hair, throw dust on themselves and howl; the midwife beats, punches and shakes the unfortunate woman until the child is born or death puts an end to the performance."

In speaking of dystocia it might be well to refer to mixed marriages as an etiologic factor. Even the savages recognize this factor and attempt to avoid it. Dr. Faulkner, who spent many years among various Indian tribes, says he never knew of a dystocia resulting in calamity except when a squaw attempted to give birth to a half-breed.

Dr. Bell who spent some time in South Sea Islands tells of a tribe of half-breeds who have a peculiar custom. In protracted labor the woman is placed on her back, a long plank is procured and her belly is made the fulcrum for a teeter. He tells a sad story of a case with which he was brought in contact. A young girl of the community at about her nineteenth year began to show abdominal enlargement. She had never menstruated but had the prodromal symptoms every month. This condition together with continued abdominal enlargement continued about one year, and the neighbors considered her pregnant.

On one of her periodical occasions she noticed an egg-shaped mass protruding from the vulva and called attention to it. A granny who happened to be present recognized an amniotic sac and said labor was in progress, in spite of the girl's protestation that she was not and never had been pregnant. For twenty-four hours she was treated as a parturient in normal labor. The protruding mass was observed to advance and recede with each pain, which for psychologic reasons perhaps, had become regular. At the end of this time the midwife became tired and determined to resort to the teeter treatment. The poor girl's pleadings were in vain. She was placed on a bench and a plank balanced across her prostrate form; an obliging neighbor mounted each end. After an hour of this maneuvering the girl was about tortured to death but as the desired effect was not produced, a third old woman climbed to the center of the plank over the girl's abdomen. At the first quick move the abdominal wall gave way and the unfortunate victim literally burst and an offensive, dark tarry fluid gushed out. Of course the girl collapsed but as life was still present Dr. Bell was sent for. He arrived some five hours later. The patient was moribund. It was a case of imperforate hymen. The uterus, tubes and vagina had been enormously distended with collected and retained menstrual fluid.

Some of these people, living nearer the towns or other centers of civilization, have discarded the plank method and instead use a long sheet or blanket that is given one turn around the woman's body leaving two free ends, each of which is seized and pulled upon by the midwife's assistants.

The Eskimo woman is not permitted to be confined in the native house but must go into the woods with her own hands scoop a hole or cave in the snow bank which she occupies alone. Not even her husband attends her. She is supposed to remain away from home for five days with no food except a piece of dried fish. Dr. C. C. Gleaves describes an account of one of the scenes he witnessed. The thermometer registered 40° F. below zero. "I found the woman in a snow pit, oval in shape, about two feet deep and six feet across, with a few spruce boughs thrown around the margin as a windbreak. The woman had further prepared the parturient chamber by scattering a thin layer of dried grass, saved for this occasion, upon which was spread a reindeer skin. There was no covering of any kind. The woman was on her knees with buttocks resting on her heels and

having severe bearing-down pains, coming faster and faster until almost continuous, when the sac ruptured. Labor progressed normally till the end of the second stage when after a rest of forty-five minutes the placenta was expelled. She then took a piece of sinew prepared from the hock of a deer, ligated the cord and severed it with a piece of serrated flint. She then washed the babe in snow, although it kicked and squalled lustily at such a cold reception. After the bath she wrapped the babe in a piece of skin and proceeded laboriously, leaving a trail of blood, to another snow pit some fifty feet away which she had previously prepared, as it is considered unclean for a mother to remain any length of time in a place where a babe is born." Notwithstanding the rigorous conditions surrounding the Eskimo mother in childbirth, the rate of mortality of the infants will compare favorably with our own. The same may be said of the maternal mortality.

Among the Philippine tribes, known as the Head Hunters, the following procedure is in vogue: When a woman feels the pain of labor coming on she immediately repairs to a certain place arranged for this purpose. Here are two pieces of bamboo, one lashed to either side of two convenient trees, the space between being large enough for the head and shoulders to pass through but not the pregnant woman's abdomen. The woman crawls up between these pieces of bamboo until the upper part of her abdomen presses against them; then she reaches up and grasps another piece of bamboo that is placed above, and pulls with her hands, at the same time pushing up with her feet and legs. In this way the baby is pressed and squeezed out. The husband, who is kneeling down between her legs, catches the baby, wraps it in banana leaves, and carries it into the house. The woman, after getting rid of the placenta, washes herself and goes into the house, washes the baby and goes about her work.

The ordinary obstetricians of the Sandwich Islands are old men who take the parturient women on their knees and rub the abdomen from behind until the child is born. Women draw the tongue of the mother out of her mouth until she vomits and the afterbirth comes away. Next the patient takes a bath in the sea, and at once resumes her ordinary duties. If the labor is difficult, the attendants know they have to deal with a half-breed, with a large head, and the child is killed as is usual among other uncivilized people. On the Sandwich Islands labor was formerly a public performance and could be witnessed by all who happened to be near. The same lack of privacy obtains in some parts of India, among the Mohammedans.

CHAPTER IX

CUSTOMS IN CHINA; INDIA; JAPAN; AND INDIANA, U. S. A.

In southern China the husband is the accoucheur and physician, no one else being allowed in the room until after the birth of the child. The woman sits on the edge of the bed or stool and the fetus is expelled into the hands of the husband who ligates and cuts the cord. The woman then thrusts her fingers into her throat to induce vomiting, during which the placenta is usually expelled. All complicated and difficult labors are attributed to evil spirits and aside from strenuous efforts to exorcize these, nothing is attempted to facilitate delivery.

A Chinese wife is extremely anxious to present her husband with sons who will perpetuate his name, and burn incense before his tablet after death. Female children are of so little account that when a baby girl is born she is often destroyed. A childless wife sometimes, however, adopts a girl from another family, believing that this course will make her a happy mother.

As the time approaches for a woman to give birth to a child, a custom is observed in some families for the purpose of propitiating two female demons believed to be present with the intention of killing the woman. A table is spread with plates of food, incense, flowers and false money. A priest makes suitable recitations. At the end of this ceremony various evil spirits are invited to come and receive the worship of the woman and her husband.

The influence of emotion is fully recognized as of assistance in the expulsion of a slow fetus, particularly in Russia and India. A sudden shock or scare often proves a wonderful help in delivery. It is said that the Kalmucks have a number of men, with their guns in readiness waiting near the bed of the patient. As soon as the midwife gives the signal the men fire simultaneously thinking to assist nature by the sudden fright the noise must cause.

Dr. Forwood, who attended a Comanche squaw in difficult labor, said his patient, on a former occasion, was taken out on the plain, and a warrior, mounted on his fastest steed, with all his war paint and fighting equipment on, charged upon the patient at full speed, turning aside only at the last moment when she expected to be pierced through the body and trampled under foot. This ordeal was said to have been followed immediately by the expulsion of the babe.

To us, the custom of the Hindu seems especially barbarous. As the time of parturition approaches the expectant mother, often a mere child in years and a babe in knowledge, is banished to a hut where she endures solitary confinement for from two to four weeks. The door and window are tightly closed to keep out evil spirits, this keeps out light and fresh air also. A wood fire is kept burning night and day for the purpose of purifying the woman who is considered unclean. The smoke finds its way out through whatever cracks or openings there may be in the thatched roof or bamboo walls. A powder of pepper and ginger is given the patient daily, otherwise she is left to her fate. Under this procedure over thirty per cent of the mothers succumb during the period of confinement.

In Calabar three kinds of conception are deemed disastrous: those resulting (1) in twins; (2) in an embryo which dies in utero; (3) a fetus which dies soon after birth. To avoid the development of these products, medicines are given, the idea being that if pregnancy stands the test the fetus must be strong and healthy. In event the ovum is expelled it is presumed that it must have been one of the undesirable cases of which no good could have come. The medicines are first given by mouth, then by rectum, later by the vagina and applied directly to the os uteri, provided a bloody discharge follows the first dose. The application to the os consists of euphorbia and quinea pepper mixed with saliva. In a few days abortion takes place.

The groans and cries of the parturient woman are concealed by laughter, conversation and singing of surrounding relatives so that

not a cry can be heard, as it would dishonor the patient and cause the family to repudiate her. At the same time the husband is clothed like a woman, put to bed and sighs terribly as if in pain.

A similar custom formerly existed in Greenland and among certain Canadian tribes. While the woman who has been delivered attends to her household duties her husband goes to bed and receives the visits of condolence from friends and relatives. This custom is also followed among some African tribes.

Nearly all primitive people resort to manipulation or massage of some sort to remove the placenta, although it is rare to hear of traction on the cord. The third stage is usually prompt. The most common excitement to speed is the provocation of nausea and vomiting by mechanical or other means such as the ingestion of a liberal dose of soapsuds or melted mutton suet. If this is retained long enough to have a laxative effect the contents of the uterus are expelled with that of the bowels. Administration of snuff to the nostrils until sneezing is induced is frequent where and since tobacco is known.

Dr. H. R. Tilton mentions an instance where a patient had been given more than a pint of raw beans. These were expected to swell and by pressure drive out the placenta. This failing, she had been vigorously choked with the hope that during a paroxysm of struggle the placenta would make its exit. Tilton finally removed it by inserting his hand in the uterus.

In some of the Japanese provinces a stout string is attached to the mother's great toe while the leg is slightly flexed. As the leg is gradually extended the placenta is drawn out.

There is no unanimity regarding the time for severing the cord. Some cut it promptly; others leave it until the completion of the third stage, no matter how long. About six hundred years B.C., Ezekiel is quoted as saying, "In the day thou wast born thy navel was not cut, neither was thou washed; thou wast not salted at all."

Regarding the period of suckling, time seems to vary greatly. As a rule the child is nursed so long as the milk lasts or until another conception occurs. Thus the Australians suckle from one to three years, Arabians at least two years. In portions of Africa nursing continues during a succeeding pregnancy, the child being called the "outside twin."

For the purpose of weaning the child it is customary in South Africa to smear asafetida and other noxious substances on the nipple. Some use the fresh juice of aloe leaves and in Zanzibar cayenne pepper is used for the same purpose.

We are inclined to look with amusement and perhaps a degree of pity on some of the superstitions and practices of the primitive peoples, yet I believe that, when we take into consideration the opportunities for enlightenment, some of our foolish if not vicious ideas are much less excusable.

It was common among Indian tribes to suppose that labor was instigated by voluntary acts on the part of the fetus, due to his desire to escape from his confined quarters. The character also of the labor being due to the disposition of the fetus. This belief afforded good and sufficient grounds for the destruction of the fetus by efforts at expulsion, later by embryotomy, as a child so perverse as to

complicate his own delivery merited death. The Papagos seemed to have a philosophic way of regarding accidents in labor. They considered the fetus responsible for obstruction in labor, and deemed it better that such villainous offspring should perish than be born and grow up to do injury to his people.

Today, in Delaware County, Indiana, we have babies who are "liver growd" and must be passed through a loop of twine manipulated by an ignorant old hag before the potential pride of the family has any chance to reach a normal functional development. I learn that many incantations for "Short Growth" are performed every day in Indiana. This rite must be enacted or the youngster, male or female, cannot hope to reach a dignified stature and take his proper place in state or society. Some of my respected patients have taken their babes to the imposters who do the measuring. When I inquire why such a silly thing was done, my patient will probably be embarrassed, look foolish, and say she does not believe there is anything in it, but Mrs. A. and Mrs. B. said it helped their babies, "and advised me to try it, so I did." Of course the babies *do* grow after the old grannies get through with them.

A few months ago I delivered a woman in what I considered a fairly intelligent home and community. When making an aftercall I bumped my toe against an old ax that lay under the bed. It was so unusual to see an ax in the city, particularly so in a bedroom, that I inquired why it was there. It seems that this patient had once lost a relative because of postpartum hemorrhage, and had some fear regarding her own safety. She had communicated this fear to an obliging neighbor who happened to know that an ax which had been used for decapitating chickens, turkeys or other fowls would prevent flooding when concealed in or under the bed of a parturient woman. Sure enough; there was no hemorrhage in this instance.

Of course we all know that a gravid woman is likely to wrap the umbilical cord around the fetal neck whenever she extends her hands and arms above her head as in the act of hanging clothes on the line. *But* perhaps not all of us know that this complication may easily be remedied. All the unfortunate patient has to do is to walk under the neck of a mare with foal and the coil immediately untwists. I know a woman who did this, and when her babe was born the cord was unquestionably all right. No one can ever have heard or read of a superstition among primitive people or savages that is any more ridiculous than this.

We need not compliment ourselves on a practical understanding of obstetrics until the terrifying bugaboo, birthmarks, is forever banished from the minds and imagination of our laity. May God hasten the day.

I might continue these illustrations indefinitely. I might give examples of the administration of "nanny berry" and cockroach tea, and the placenta eating habits of Brazil and some of the negroes and poor white trash of southern Georgia, Alabama and Florida, which is the precursor of our present-day glandular therapy, but I do not wish to weary the readers beyond the point of respectful endurance.

I believe that our medical schools of today are teaching an almost ideal system of obstetrics. Our teaching is now based on sound

anatomic, physiologic, hygienic and scientific facts. Every point in our demonstrations can be proved, and when we feel it our duty to do a certain thing in a certain way, we know just what causes have brought about the necessity and what the results of our efforts are likely to be.

The modern obstetrician with his intelligent mind, and his clean, trained hands can assure the parturient woman under his care that she is to have the best possible service, inspiring hope and confidence even though she may have been facing her ordeal with terror.

Correspondence

The Conservative Treatment of Eclampsia

TO THE EDITOR

AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY:

Sir:—

My attention has just been drawn to an article on the above subject, which appeared in the March, 1925 number of your journal, and I hasten to correct a slight error. Dr. E. L. King states in the paper in question that "Fitzgibbon, of the Rotunda Hospital, advocates free elimination without morphia, chloroform or venesection, and reports 204 cases with a mortality rate of 10.75 per cent." The real facts of the case, as stated in a paper by me which appeared in the *Journal of Obstetrics and Gynecology of the British Empire*, Autumn, 1922, are as follows: In the Mastership of Dr. Tweedy (1903-1910), there were 68 cases of eclampsia with 6 deaths, i.e., a mortality rate of 8.82 per cent. In the last two years of this period there were 21 cases with no mortality. In the Mastership of Dr. Jellett (1910-1919), excluding the years 1914-1917, there were 70 cases with 9 deaths, i.e., a mortality rate of 12.85 per cent. In the years 1914-1917, when Sir William Smyly, Dr. Tweedy, and Dr. Purefoy were joint Masters in the absence of Dr. Jellett at the war, there were 33 cases with 3 deaths, i.e., a mortality rate of 9.09 per cent. In the first three years of Dr. Fitzgibbon's Mastership (1919-1922), there were 33 cases with 3 deaths, i.e., a mortality rate of 9.09 per cent. Until shortly after the commencement of Dr. Fitzgibbon's Mastership, morphine was given as a routine in every case. Otherwise, the treatments under the different Masters were identical.

This note is written primarily to stress the fact that the administration of morphine was an important part of the treatment in the majority of the cases.

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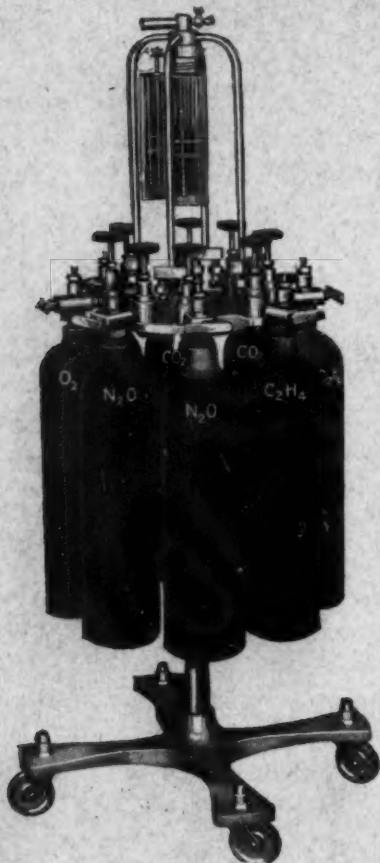
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